24-32"; DN600-800 Hydraulic Control Valves

The Best of the Biggest

- Large scale pumping systems
- National and municipal distribution networks
- Reservoir and dam level control
- Large scale industrial applications

BERMAD 24", 28", 30", 32" 700 Series Control Valves are hydraulically operated, diaphragm actuated globe pattern valves.
The valve is comprised of two major components: the body assembly and the actuator assembly.
The actuator assembly is removable from the body as an integral unit. It consists of a lower & upper control chamber. It can be converted on-site from single to double chambered actuator and vice-versa according to the required control function.

Features and Benefits

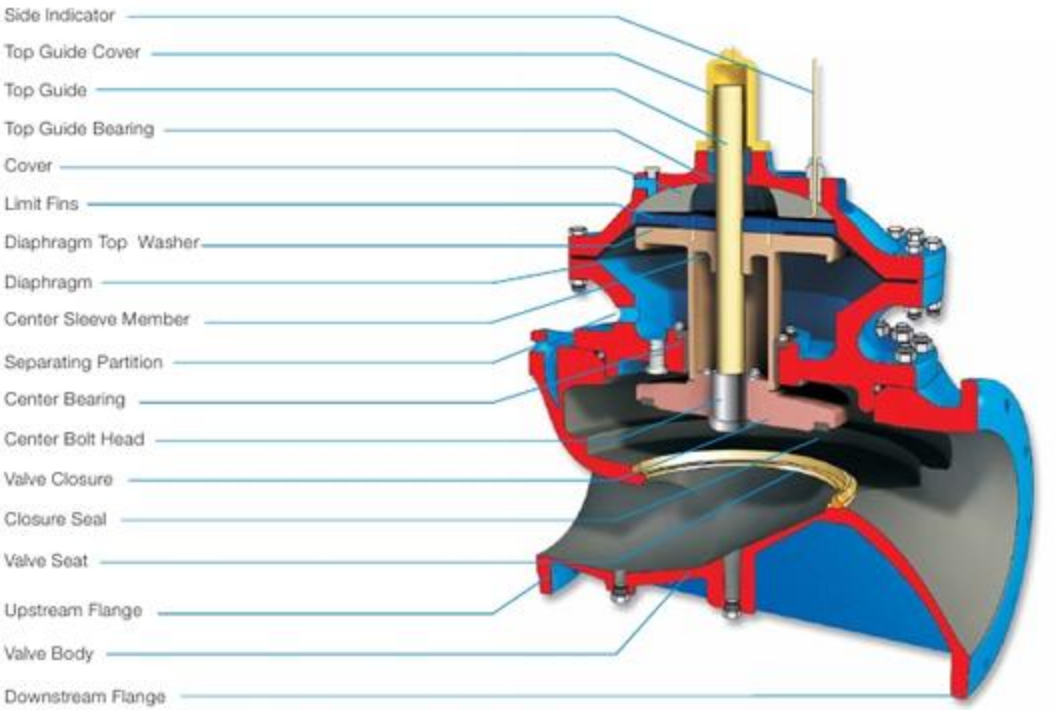
- **Globe pattern wide body with semi-straight flow:**
  - Higher flow (Kv; Cv) than standard globe pattern
  - Higher resistance to cavitation damage
- **Double chambered actuator as standard:**
  - Fast opening and non-slam closing characteristic
  - Reliable drip tight seal
  - Wide range of control function
  - Accurate control
  - Application flexibility even after installation
  - Independent cushioned action check valve
- **Easy access design:**
  - In-line serviceable
  - Quick remove actuator (minimal downtime)
  - On-site and in-line replaceable seat
- **Wide range of options and accessories**
  - One-way or two-way flow configuration
  - Wide variety of control accessories easily added on-site
- **Servo-check** – Independent action non slam check feature

Major Applications

- Solenoid controlled valve – **Model 710**
- Pressure reducing valve – **Model 720**
- Pressure sustaining/relief valve – **Model 730**
- Surge anticipating valve – **Model 735**
- Pump control valve – **Model 740**
- Pump circulation control valve – **Model 748**
- Level control valve – **Model 750**
- Check valve – **Model 760**
- Flow control valve – **Model 770**
- Burst control valve – **Model 790**
- Combination models

700 Series
24-32"
DN600-800

Valve Cross Section



Specifications

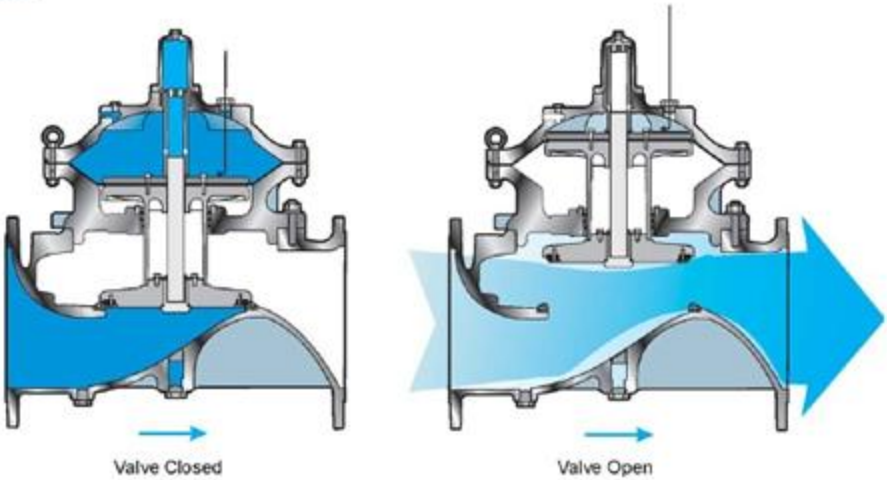
Main Valve

Valve Pattern: Globe
Size Range: 24–32"; DN600-800
End Connections (Pressure Ratings):
Flanged: ISO PN16, PN25; ANSI Class 150, 300
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 Nylon fabric-reinforced
Seals: NBR
Coating:
Fusion Bonded Epoxy, RAL 5005 (Blue)
NSF & WRAS approved
Control Chamber Displacement: 98 Liters; 26 Gallons

Control System

Standard Materials:
Accessories:
Bronze, Brass, Stainless Steel & NBR
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Pilot Standard Materials:
Body: Brass, Bronze or Stainless Steel
Elastomers: NBR
Springs: Galvanized Steel or Stainless Steel
Internals: Stainless Steel

Operation



Valve Closed

Valve Open

Application

Large Scale Pressure Sustaining & Reducing System

In this project, flow rates between 2,000 and 28,000 m3/hr are supplied through a 1,200 mm pipeline to several municipalities. Due to the various demand regimes throughout the day, and the relatively high pressures, the design required that during low flow periods pressure shall be reduced from 12 bar to 5 bar. During peak demands, back pressure had to remain at least 8 bar to protect the pumps and line components. Five parallel Pressure Sustaining and Reducing Valves Model 723 were specified and installed. They perform according to design specification and to the complete satisfaction of all involved.

Engineer Specifications

The control valve shall be double chambered, hydraulically operated and diaphragm actuated.

Main Valve: The main valve shall be a center guided, diaphragm actuated, globe valve. The body shall have a replaceable, raised, stainless steel seat ring. The valve shall have an unobstructed flow path of at least 24" diameter; DN600, 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 300 mm in diameter and center guided by a bearing in the separating partition. The replaceable radial seal disk shall include a resilient seal.

Control System: The control system shall be suited for high capacity control flow with at least ¹/₂" diameter flow path including a self-flushing inline filter. All fittings shall be forged brass or stainless steel. The assembled valve shall be hydraulically tested and factory adjusted to customer requirements.

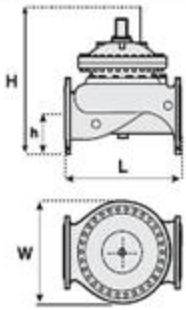
Quality Assurance: The valve manufacturer shall be certified according to the ISO 9001 Quality Assurance Standard.

700 Series

24-32"
DN600-800

Technical Data

Dimensions and Weights



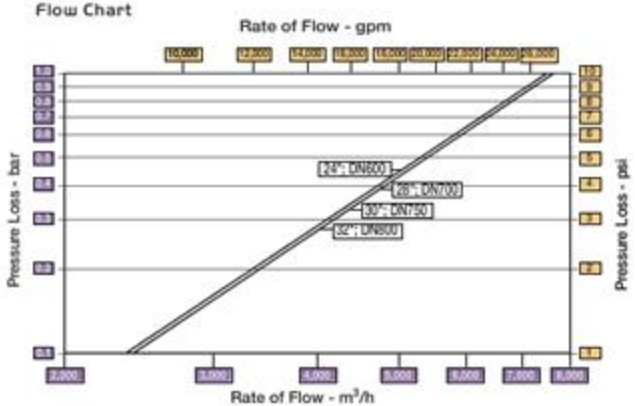
SI Metric

	DN	600	700	750	800
ISO PN 10 : 16	L	1450	1650	1750	1850
	W	1250	1250	1250	1250
	h	470	490	520	553
	H	1965	1985	2015	2048
	Weight (Kg)	3250	3700	3900	4100
ISO PN 20 : 25	L	1500	1650	1750	1850
	W	1250	1250	1250	1250
	h	470	490	520	553
	H	1965	1985	2015	2048
	Weight (Kg)	3500	3700	3900	4100

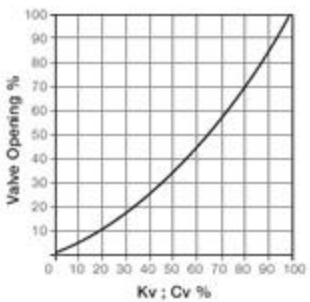
US English

	inch	24"	28"	30"	32"
ANSI 125 : 150	L	57	65	70	73
	W	49	49	49	49
	h	18.5	19	20.5	21.8
	H	77	78	79.3	80.6
	Weight (lb)	7150	8140	8580	9020
ANSI 250 : 300	L	59	65	70	73
	W	49	49	49	49
	h	18.5	19	20.5	21.8
	H	77	78	79.3	80.6
	Weight (lb)	7700	8140	8580	9020

Flow Chart



Kv ; Cv to Valve Opening Chart



24" - Kv = 7,350 ; Cv = 8,490
28,30,32" - Kv = 7,500 ; Cv = 8,670

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	24"	720	55	G	C	16	EB	4AC	CB	S

Sector		Primary Feature		Additional Feature		Pattern		Body Material		End Connections		Coating		Voltage & Position		Tubing & Fittings		Additonal Attributes	
Waterworks	24 - 32"	Solenoid controlled valve	710	No Additional Feature	00	Globe (24-32" only)	G	Ductile Iron Standard	C	Epoxy FB Blue	EB	24VAC/50Hz - N.C.	4AC	Copper Tubing & Brass Fittings	CB	Valve Position Indicator	I
		Electronic control valve	718	Solenoid-Controlled	55			Cast Steel	S	Polyester Green	PG	24VAC/50Hz - N.O.	4AO	Plastic Tubing & Brass Fittings	PB	Electric Limit Switch	S
		Pressure reducing valve	720	Bi-Level Electric Float	65			St. Steel 316	N	Polyester Blue	PB	24VDC - N.C.	4DC	St. St. 316 Tubing & Fittings	NN	Valve Position Transmitter	Q
		Pressure sustaining / relief valve	730	Bi-Level Vertical Float	66			Nickel Alumin. Bronze	U	Uncoated	UC	24VDC - N.O.	4DO			St. St. 316 Control Accessories	N
		Surge anticipating valve	735	Altitude Pilot	80							24VDC - L.P.	4DP			Pressure Gauge	6
		Pump control valve	740	Multiple choices permitted				ISO-16	16	Use when electric control additional feature is selected		220VAC/50-60Hz N.C.	2AC	Multiple choices permitted			
		Pump circulation control valve	748					ISO-25	25			220VAC/50-60Hz N.O.	2AO				
		Level control valve	750					ANSI-150	A5								
		Flow control valve	770					ANSI-300	A3								
		Burst control valve	790					JIS-16	J6								
								JIS-20	J2								

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Basic Valve

The basic diaphragm actuated Model 700/705 and piston actuated 800/805 valves are hydraulically operated globe valves in either the standard oblique (Y) or angle pattern design. Each valve comprises two major components: the body seat assembly and the actuator assembly.

The actuator assembly is unitized and is removable from the body as an integral unit. It consists of both an upper and a lower control chamber. Each basic valve can easily be configured, on-site, either as a single chamber control valve (Model 705/805), or a double chamber control valve (Model 700/800). The shaft sub-assembly, in both single and double chambered versions is center guided, providing an unobstructed seat area.

The Model 700/800 Basic double chambered valve operation is independent of valve differential pressure since the line pressure actually serves as the actuator differential pressure. This develops maximum power, ensuring immediate valve response. The upper control chamber is pressurized to close and vented to open the valve. The lower control chamber is usually vented to the atmosphere, but can also be pressurized to power the valve open.

The Model 705/805 Basic Valve uses valve differential pressure to power the actuator open or closed. The lower control chamber, which serves to cushion the closing of the valve, is exposed to the downstream pressure, through a fixed orifice connected to the downstream side of the valve. The pressure in the upper control chamber varies, usually resulting from the combined action of a regulating pilot and a fixed orifice. This varying pressure modulates the valve to open or close.

The Basic Hydraulic Valve is available in a wide range of materials, sizes, pressure ratings, and end connections. Single or double chambered versions are used as the main valve in all 700 and 800 Series applications.

Diaphragm Actuated Valve

Piston Actuated Valve

[1] - Double Chambered Actuator

- Actuator assembly can be removed as one integral unit
- Simple on-site conversion to single chambered

[2] - Diaphragm Assembly

The flexible, unshaped, nylon reinforced diaphragm is supported over the majority of its surface.
Diaphragm load is limited to only the stretching forces applied to the active area.

[3] - Piston Assembly

Vented lower chamber provides differential piston principle of operation and air cushioning. Constant active area together with the sturdy construction and unobstructed long travel ensures stable and accurate regulation. The "shaft diameter" central guiding and the dynamic piston seal reduce friction and jamming risk.

[4] - Cover Plug

Enables on-site retrofit of:

- **Indicator [4A]:** For visual valve position indication
- **Limit Switch:** For signaling valve position
- **Position Transmitter:** For analog transmission of valve position

[5] - Inherent Separation Partition

The inherent separation partition includes the bearing [5A], which provides complete central guiding for the valve moving assembly. The separation partition separates the lower control chamber from the flow in both the single chambered, and the double chambered configurations.

[6] - Spring

Required for single chambered configurations. Superfluous for double chambered configurations (unless check feature is required).

[7] - Seal Disk Assembly

Self-aligning seal disk assembly provides balanced, free movement and a resilient seal for perfect, drip tight sealing. It enables using several variations of seals and plugs for a wide range of applications and working conditions.

[8] - Seat

Stainless Steel, raised, replaceable in-line and on-site.

[9] - Wide Body ("Y" or Angle pattern)

Hydro-dynamically designed for efficient flow with minimal pressure loss and excellent resistance to cavitation. Full bore, valve port area clear of obstructions; no ribs or stem guides. Increases capacity by 25% over standard globe valves.

[10] - End Connections

Conforms to pressure ratings and standards of: ISO, ANSI, JIS, BS, and others.

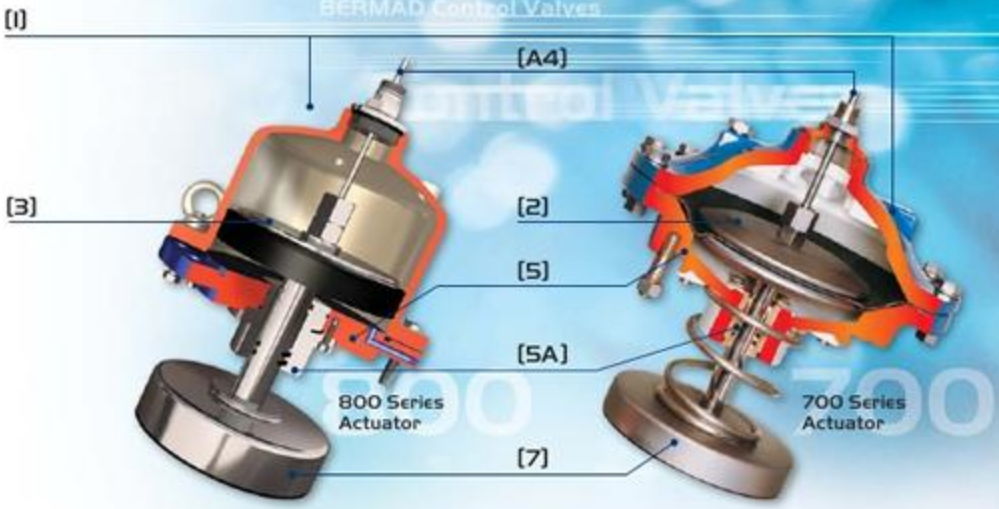
Valve Plug Options

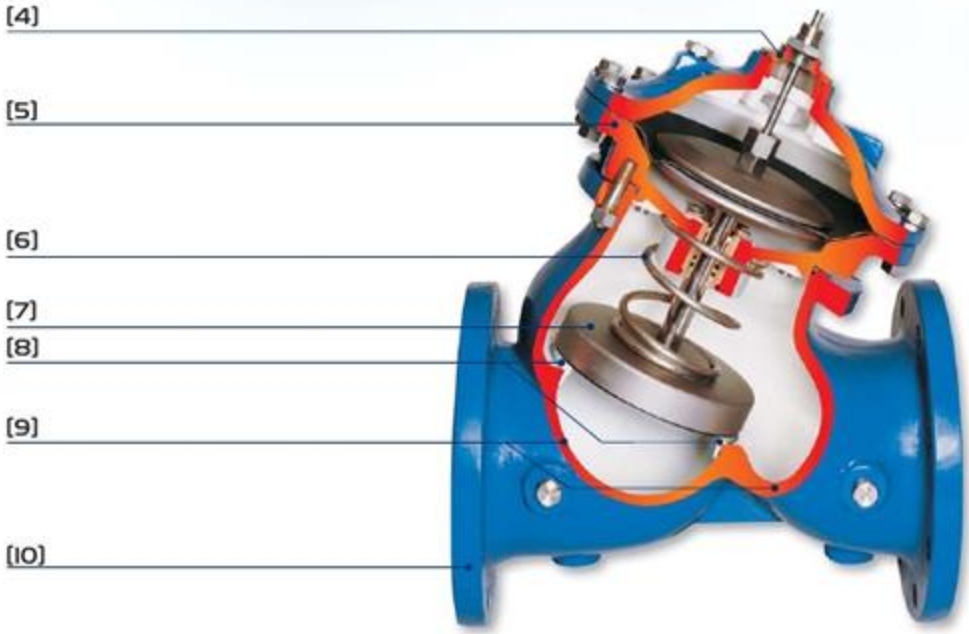
Flat disk

"Quick opening plug":
Standard plug provides high flow and quick response.

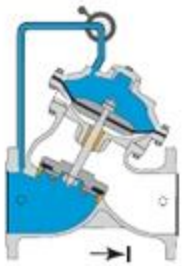
Throttling Plug

A throttling plug is used in order to provide more accurate, stable and smooth response for pressure and flow regulation while reducing noise and vibration.
Two types are available: "U" shape (standard) and "V" shape.


[1]
[A4]
[3]
[2]
[5]
[5A]
800 Series
Actuator
700 Series
Actuator
[7]

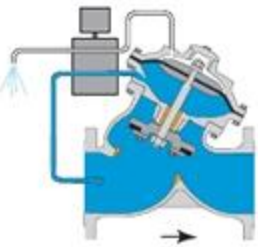

[4]
[5]
[6]
[7]
[8]
[9]
[10]

On-Off Modes



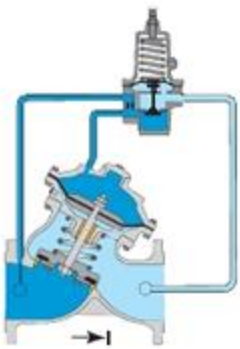
Closed Position
Line pressure applied to the upper control chamber of the valve creates a superior force that moves the valve to the closed position and provides drip tight sealing.

Open Position
Discharging the pressure in the upper control chamber to atmosphere or some other lower pressure zone causes the line pressure acting on the seal disk to move the valve to the open position.



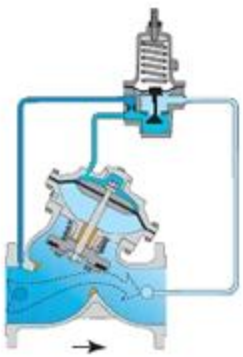
Powered Open Position
Line pressure is applied to the lower control chamber as pressure in the upper control chamber is vented. This, together with the line pressure acting on the seal disk, creates a force that powers the valve to the open position.

Modulating Mode
(Pressure Reducing)



Closed Position
The closed adjustable pilot valve traps line pressure in the upper control chamber. The resulting superior force moves the valve to the fully closed position and provides drip tight sealing.

Modulating Position
The pilot valve senses line pressure changes and opens or closes accordingly. It controls the accumulated pressure in the valve upper control chamber, causing main valve to modulate to an intermediate position and maintain the preset pressure value.



Open Position
The open pilot valve releases line pressure from the upper control chamber. The line pressure acting on both the lower control chamber and the seal disk, moves the valve to the open position.

* The above text is valid for both 700 and 800 Series.

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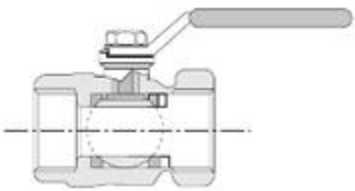
2-Way Ball Valve

This Ball Valve provides quick and easy on/off manual control for isolating, manual releases and drains.



Technical Data

Pressure rating:
40 bar (600 psi) - 1/4" to 3/4"
35 bar (500 psi) - 1" to 2"
Standard materials:
Body: Brass
Ball: Brass (Nickel & Chrome plated)
Seals: PTFE & FPM
Handle: Galvanized Steel (vinyl grip)
Optional materials:
Stainless Steel metal parts
Ports:
1/4", 3/8" & 1/2" NPT
3/4", 1", 1 1/2" & 2" BSP
Maximum temperature: 185°C (365°F)

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2-Way Solenoid Valve

Servo-Assisted Diaphragm Actuated

This is a diaphragm actuated, servo-assisted pilot operated 2-Way solenoid valve.
It is available in two versions:
- Normally Closed (Model: 5281A)
- Normally Open (Model: 0281B)

Model 5281A

Model 0281B

Features

- High flow rates (low head loss)
- Normally Open or Closed version

Technical Data

Standard materials:
Body: Brass
Elastomers: NBR
Enclosure: Molded epoxy
Internals: Stainless Steel

Ports: ½", ¾" NPT

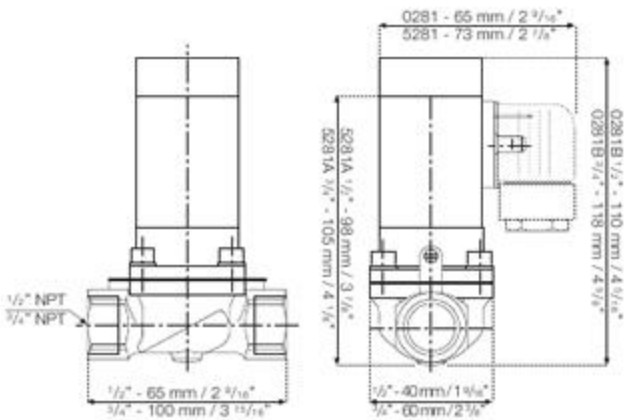
Temperature:
Nominal ambient: 0.5 to 55°C (33 to 131°F)[1]
Maximum fluid: 0 to 90°C (32 to 194°F)

Enclosure type:
One-piece molded epoxy.
General purpose: IP 65 with DIN, cable plug

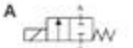
Electrical data:
Voltages:[2]
(ac): 24, 110, 220 (50Hz)
(ac): 24, 120, 240 (60Hz)
(dc): 24, 110, 220
Tolerance: ±10%
Power consumption:
(ac): 21 VA, inrush; 12 VA (8W), holding
(dc): 8W

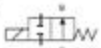
Hydraulic data:

Port Size	Orifice DN	Flow Factor		Pressure Range[3]	
mm	mm	Kv	Cv	Bar	psi
½"	13	4.0	4.7	0.2-16	3-230
¾"	20	5.0	5.8	0.2-16	3-230



Circuit functions

A

2-Way
Normally Closed

B

2-Way
Normally Open

Notes:

(1) Max. ambient temperature is determined under continuously energized conditions, and with max. fluid temperature.
(2) 5281A AC coils can be replaced with AC or DC coils; DC coils can be replaced only with other DC coils. 0281B coils are not replaceable.
(3) A minimal pressure differential of 0.5 bar (7.5 psi) is required for complete opening.

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2-Way Solenoid Valve

High Pressure Servo-Assisted Piston Actuated

This is a piston actuated 2-Way servo-assisted pilot operated 2-Way solenoid valve.

It is available in two versions:
- Normally Closed (model: 5404A)
- Normally Open (model: 0404B)

Model 5404A

Model 0404B

Features

- High pressure applications
- Unaffected by pressure surges
- Normally Open or Closed versions

Technical Data

Standard materials:
Body: Brass
Elastomers: NBR & PTFE
Enclosure: Molded epoxy
Internals: Stainless Steel

Ports: ½" NPT

Temperature:
Nominal ambient: 0.5 to 55°C (33 to 131°F)[1]
Maximum fluid: 0 to 90°C (32 to 194°F)

Enclosure type:
One-piece molded epoxy
General purpose: IP 65 with DIN, cable plug

Electrical data:
Voltages:[2]
(ac): 24, 110, 220 (50Hz)
(ac): 24, 120, 240 (60Hz)
(dc): 24, 110, 220
Tolerance: ± 10%
Power consumption:
(ac): 21 VA, inrush; 12 VA (8W), holding
(dc): 8W

Hydraulic data:

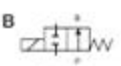
Circuit Functions	Orifice DN	Flow Factor		Pressure Range[3]	
	mm	Kv	Cv	Bar	psi
A (N.C.)	12	2.0	2.3	1-50	15-725
B (N.O.)	12	2.0	2.3	1-32	15-464

Circuit functions

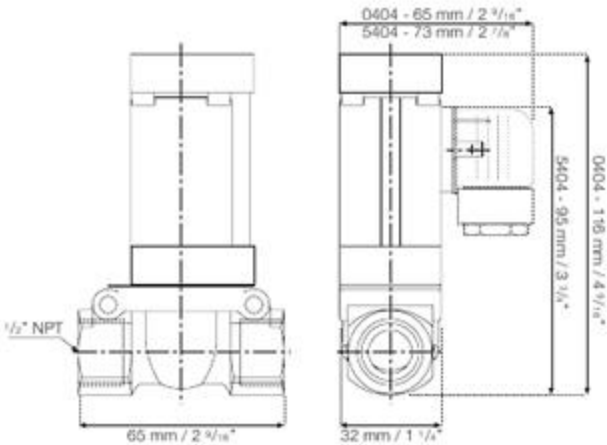
A

2-Way
Normally Closed

B



2-Way
Normally Open



Notes:

(1) Max. ambient temperature is determined under continuously energized conditions, and with max. fluid temperature.
(2) 5404A AC coils can be replaced with AC or DC coils; DC coils can be replaced only with other DC coils. 0404B coils are not replaceable.
(3) A minimal pressure differential of 1.0 bar (15 psi) is required for complete opening.

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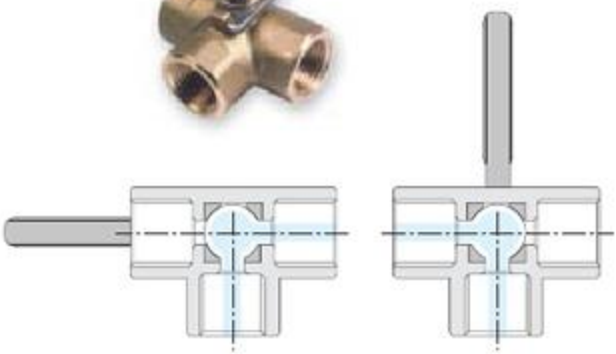
3-Way Ball Valve

This 3-Way valve is used as a pilot valve providing quick and easy, 2-position on/off manual control.



Technical Data

Pressure rating: 27.5 bar (400 psi)
Standard materials:
Body: Brass
Ball: Brass (Chrome plated)
Seals: PTFE & FPM
Handle: Stainless Steel (vinyl grip)
Optional materials:
Stainless Steel metal parts
Ports: ¼", ⅜" & ½" NPT
Maximum temperature: 150°C (300°F)

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3-Way Accelerator

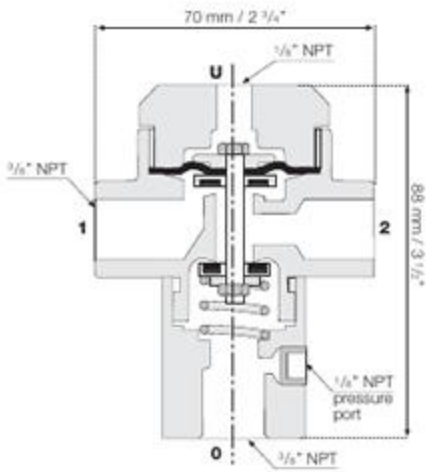
This 3-Way, single chamber accelerator is a hydraulically operated, diaphragm actuated, pilot that, in response to pressure applied to its control chamber, directs flow and pressure between its ports:

- When pressure is applied to its control chamber, it connects port "0" to "2".
- When pressure is released from its control chamber, it connects port "2" to "1".

This pilot can be used to either relay and accelerate a signal (N.O.), or to reverse and accelerate a signal (N.C.).

Technical Data

Pressure rating: 25 bar (350 psi)
Minimum operating pressure: 0.8 bar (12 psi)
Working temperature: Water up to 80°C (180°F)
Flow factor:
Closing: 0 to 2 & 1 to 2: Kv 1.2 (Cv 1.4)
Opening: 2 to 1 & 2 to 0: Kv 1.0 (Cv 1.2)
Standard materials:
Body & cover: Brass
Elastomers: NBR
Internals: Stainless Steel & Brass
Optional materials:
Metal parts: Stainless Steel, Nickel Aluminum Bronze, Hastalloy
Elastomers: FPM (Viton®)



Weight: 0.8 Kg / 1.7 lbs.

Connections:

Port	N.O. *	N.C. **
1	Upstream pressure	Vent
2	Control chamber	Control chamber
0	Vent	Upstream pressure
U	Command	Command

* With top spring - special order.
** With bottom spring - standard.

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3-Way Double Chambered Accelerator

This 3-Way, double chambered accelerator is a hydraulically operated, diaphragm actuated pilot that, in response to command pressure applied to either the upper or lower control chamber, directs flow and pressure between its ports.

- When forces in the upper control chamber are greater, it connects port "C" to "A".
- When forces in the lower control chamber are greater, it connects port "A" to "0".

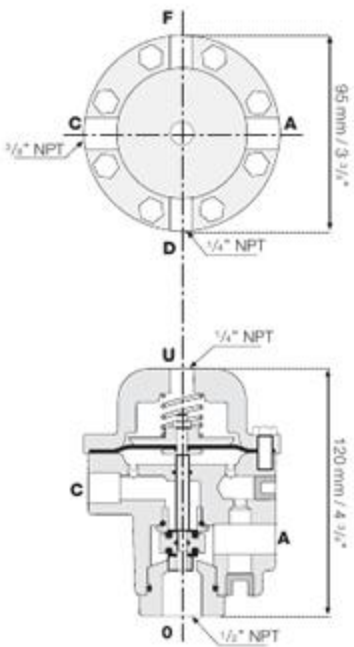
This pilot can be used to either relay and accelerate a signal (N.O.), or to reverse and accelerate a signal (N.C.). As a double chambered pilot, it is suitable even when line pressure is very low.

Technical Data

Pressure rating: 25 bar (350 psi)
Minimum operating pressure: 0.2 bar (3 psi)
Working temperature: Water up to 80°C (180°F)
Flow factor:
C to A: Kv 2.25 (Cv 2.63)
A to 0: Kv 2.77 (Cv 3.24)
Standard materials:
Body & cover: Brass
Elastomers: NBR
Internals: Stainless Steel & Brass
Optional materials:
Metal parts: Stainless Steel, Nickel Aluminum Bronze, Hastalloy
Elastomers: FPM (Viton®)

Connections:

Port	N.O.	N.C.
C	Upstream pressure	Upstream pressure
A	Control chamber	Control chamber
0	Vent	Vent
F/D	Command	Upstream pressure
U	Vent	Command



Weight: 2.45 Kg / 5.4 lbs.

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Model 58HC

3-Way Double Chambered High Capacity Accelerator

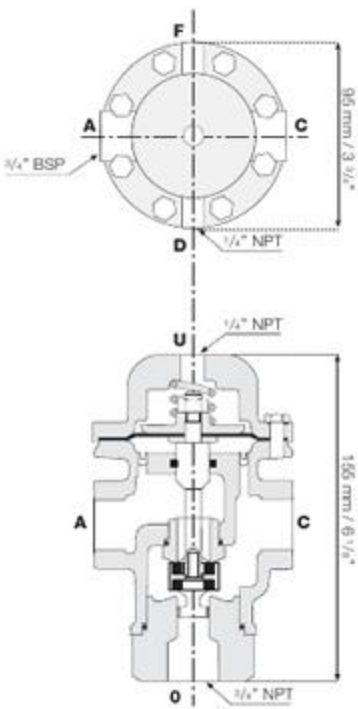
This 3-Way, double chambered, high capacity accelerator is a hydraulically operated, diaphragm actuated pilot that, in response to command pressure applied to either the upper or lower control chamber, directs flow and pressure between its ports.

- When forces in the upper control chamber are greater, it connects port "A" to "C".
- When forces in the lower control chamber are greater, it connects port "C" to "0".

This pilot can be used to either relay and accelerate a signal (N.O.), or to reverse and accelerate a signal (N.C.). As a double chambered pilot, it is suitable even when line pressure is very low.

Technical Data

Pressure rating: 25 bar (350 psi)
Minimum operating pressure: 0.2 bar (3 psi)
Working temperature: Water up to 80°C (180°F)
Flow factor:
A to C: Kv 3.5 (Cv 4.1)
C to 0: Kv 4.6 (Cv 5.4)
Standard materials:
Body: Bronze
Cover: Brass
Elastomers: NBR
Internals: Stainless Steel & Brass
Optional materials:
Metal parts: Stainless Steel, Nickel Aluminum Bronze, Hastalloy
Elastomers: FPM (Viton®)



Weight: 3.25 Kg / 7.2 lbs.

Connections:

Port	N.O.	N.C.
A	Upstream pressure	Upstream pressure
C	Control chamber	Control chamber
0	Vent	Vent
F/D	Command	Upstream pressure
U	Vent	Command

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3-Way Solenoid Valve

Direct Acting – Plunger Actuated

This solenoid valve is direct acting 3-Way (can also be used as 2-Way) plunger actuated solenoid valve. It has a compact construction and is suitable for controlling BERMAD's hydraulic control valves using water or air. This solenoid valve does not require a minimum operating pressure and is not affected by the mounting position. Its construction also provides long life and durability. The epoxy encapsulation efficiently dissipates heat, to suit continuous duty applications.

Features

- Short response time
- Compact design
- Wide pressure range
- Normally Open or Closed versions

Technical Data

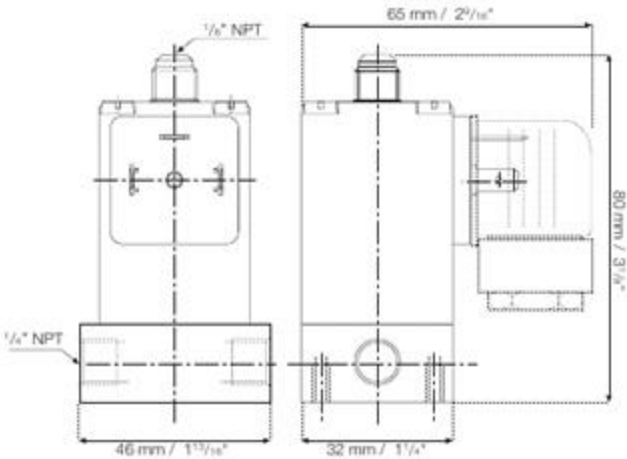
Standard materials:
Body: Stainless Steel 316
Elastomers: FPM (Viton®)
Enclosure: Molded epoxy
Internals: Stainless Steel

Ports: 1/4", 1/8" NPT

Temperature:
Nominal ambient: 0.5 to 55°C (33 to 131°F)[1]
Maximum fluid: 0 to 90°C (32 to 194°F)

Enclosure type:
One-piece molded epoxy
General purpose: IP 65 with DIN, cable plug

Electrical data:
Voltages:
(ac): 24, 110, 220 (50Hz)
(ac): 24, 120, 240 (60Hz)
(dc): 24
Tolerance: +/-10%
Power consumption:
(ac): 21 VA, inrush; 14 VA (8W), holding
(dc): 8W



Hydraulic data:

Orifice DN[2]	Pressure Range	
mm	Bar	psi
0.8	0-40	0-580
1.0	0-30	0-435

Circuit functions

A: 2-Way Normally Closed
B: 2-Way Normally Open
C: 3-Way Normally Closed
D: 3-Way Normally Open

Notes:
(1) Max. ambient temperature is determined under continuously energized conditions, and with max. fluid temperature.
(2) Required filtration – 500 micron.
(3) 311A or 311C (P port is plugged)
(4) 311B or 311D (P port is plugged)

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3-Way Solenoid Valve

Direct Acting with Isolating Membrane

This solenoid valve is direct acting 3-Way (can also be used as 2-Way) pivoted armature actuated. Its design includes a membrane that hermetically isolates the solenoid actuator from the fluid, making it less sensitive to abrasive or contaminated fluid than a plunger actuated solenoid. This solenoid valve provides best performance with maximum reliability and a long service life, even in seawater applications. The epoxy encapsulation efficiently dissipates heat, to suit continuous duty applications.

Features

- Dry electro-mechanical parts
- Solenoid isolated from fluid
- Manual override
- Normally Open or Closed versions

Technical Data

Standard materials:
Body: Brass
Elastomers: NBR
Enclosure: Molded epoxy

Optional materials:
Body: Stainless Steel 316

Ports: 1/4" NPT

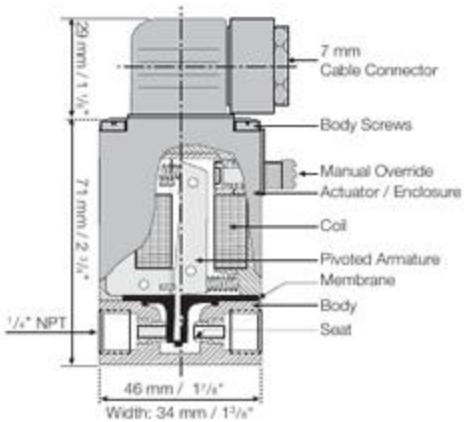
Temperature:
Nominal ambient: 0.5 to 55°C (33 to 131°F)[1]
Maximum fluid: 0 to 90°C (32 to 194°F)

Enclosure type: One-piece molded epoxy
General purpose: IP 65 with DIN, cable plug

Electrical data:
Voltages:
(ac): 24, 110, 220 (50Hz)
(ac): 24, 120, 240 (60Hz)
(dc): 24, 110, 220
Tolerance: +/-10%
Power consumption:
(ac): 30 VA, inrush; 15 VA (8W), holding
(dc): 8W

Hydraulic data:

Orifice DN	Flow Factor		Pressure Range	
mm	Kv	Cv	Bar	psi
2.0	0.11	0.13	16	230



Weight: 0.47 Kg / 1.0 lbs.

Circuit functions[2]

Notes:

(1) Max. ambient temperature is determined under continuously energized conditions, and with max. fluid temperature.
(2) Solenoid must be applied only according to the defined circuit function. Disassembling the actuator from the body might cause solenoid malfunction.
(3) 330A or 330C (R port is plugged)
(4) 330B or 330D (R port is plugged)

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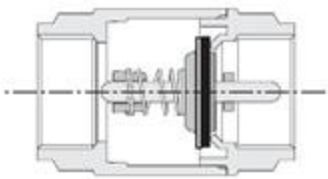
Check Valve

These spring loaded, non-return valves provide free flow in one direction but prevent flow in the opposite direction. They can be installed in any orientation.



Technical Data

Pressure rating: 20.5 bar (300 psi)
Standard materials:
Body: Brass
Spring: Stainless Steel 302
Internals: Brass
Seal: NBR
Optional materials:
Metal parts: Stainless Steel 316
Seals: FPM
Ports:
¼", ⅜" & ½" NPT
¾", 1" & 1 ½" BSP
Maximum temperature: 80°C (180°F)

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Flow Stem / Mechanical Closure

The Flow Stem enables limiting the opening stroke of a control valve or for safety-ensured mechanical closure.

Typical Applications

- Surge Anticipating Valves Models 735-M and 735-55-M
  (For limiting the relief flow)
- Burst Control Valve Model 790-M
  (For burst flow setting)

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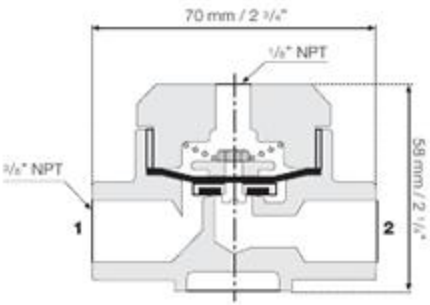
Hydraulic Relay Valve (HRV)

This 2-Way, single chamber hydraulic relay valve is a hydraulically operated, diaphragm actuated control valve that either opens fully or shuts off in response to pressure applied to its control chamber.

Technical Data

Pressure rating: 25 bar (350 psi)
Working temperature: Water up to 80°C (180°F)
Flow factor: Kv 1.3 (Cv 1.5)
Standard materials:
Body & cover: Brass
Elastomers: NBR
Internals: Stainless Steel & Brass
Optional materials:
Metal parts: Stainless Steel, Nickel Aluminum Bronze, Hastalloy
Elastomers: FPM (Viton®)



Weight: 0.6 Kg / 1.3 lbs.

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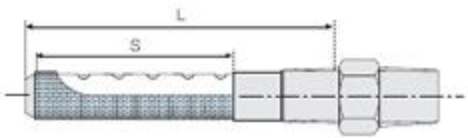
In-Line Filter

This self flushing In-Line Filter is used for filtration of control fluid of medium and potable water qualities. The flowing fluid continuously flushes the filter element.



Technical Data

Pressure rating: 25 bar (350 psi)
Standard materials:
Body: Brass
Screen: Stainless Steel 316
Optional materials: Stainless Steel 316
Filter element: 400 micron (40 mesh)
Threads: 1/4", 3/8" & 1/2" NPT
Maximum temperature: 140°C (285°F)

		1/4"		3/8"		1/2"	
		mm	inch	mm	inch	mm	inch
Short	L	42	1 5/8"	80	3 1/4"	–	–
	S	15	9/16"	50	2"	–	–
Long	L	57	2 1/4"	55	2 1/8"	136	5 3/8"
	S	30	1 1/8"	25	1"	80	3 1/8"

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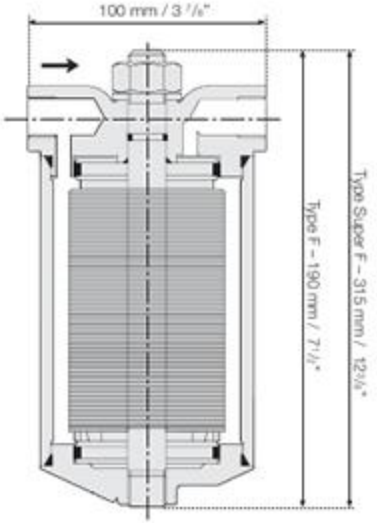
Large Control Filter

The Large Control Filter is used for filtration of dirty control fluid that would quickly block a smaller filter element. This larger filter increases the reliability of the control valve system and time between maintenance, while minimizing faulty operation.

Large Control Filter types:
Type F – Standard
Type Super F – Double size filter element

Technical Data

Pressure rating: 25 bar (350 psi)
Standard materials:
Body: Epoxy coated Steel
Covers: Brass
Stem & nut: Stainless Steel 303
Seal: NBR
Disks: Polypropylene
Optional materials:
Metal parts: Stainless Steel 316
Stem: PH-17-4
Filter element: 60 mesh
Ports: ³/₈" NPT
Maximum temperature: 80°C (180°F)



Weight: Type F - 2.7 Kg. (6 lbs.)
Type Super F - 5.3 Kg. (11.7 lbs.)

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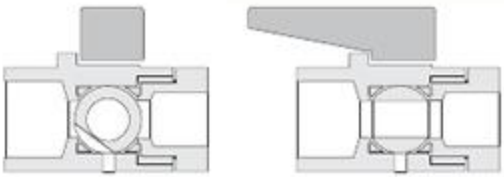
Manometer Ball Valve

This vented 2-Way Ball Valve provides quick and easy manual isolating and venting of either pressure gauges or any other pressurized control loop components.

Technical Data

Pressure rating: 16 bar (230 psi)
Standard materials:
Body: Brass (Nickel plated)
Ball: Brass (Nickel & Chrome plated)
Seals: PTFE & NBR
Handle: Reinforced nylon
Ports: 1/8", 1/4" & 3/8" NPT
Maximum temperature: 80°C (180°F)



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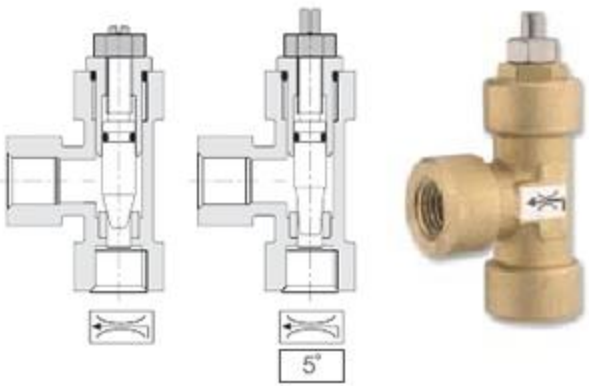
Needle Valve

This device is an adjustable restriction. When installed in various control loops it is used for controlling opening or closing speed.

Needle valve types:
5˚ - for up to 4" (100 mm) valves
15˚ - for 6" (150 mm) and larger valves



Technical Data

Pressure rating: 40 bar (600 psi)
Standard materials:
Body: Brass
Needle: Stainless Steel 303
Needle seat: Stainless Steel 303
Seals: NBR
Optional materials:
Metal parts: Stainless Steel 316
Seals: FPM
Ports: ¼" NPT
Maximum temperature: 80˚C (180˚F)

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One-Way Flow Control

This device is a 1-Way adjustable restriction. Flow in the direction of the needle is restricted while flow in the opposite direction is unobstructed. When installed in various control loops it is used for controlling opening or closing speed. Installed together with a standard needle valve, it enables controlling the opening and closing speeds in the same control loop.

Technical Data

Pressure rating: 40 bar (600 psi)
Flow factor: Kv 0.85 (Cv 1.0)
(in unrestricted flow direction)
Standard materials:
Body: Brass
Needle: Stainless Steel 303
Needle seat: Stainless Steel 303
Spring: Stainless Steel 302
Seal disk: Stainless Steel 304
Seals: NBR
Optional materials:
Metal parts: Stainless Steel 316
Seals: FPM
Ports: ¼" NPT
Maximum temperature: 80°C (180°F)

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Pressure Gauge

This robust, liquid filled Pressure Gauge is used for heavy duty service where vibration or pulsation of the pressure might cause excessive wear of a dry gauge, or where corrosive ambient conditions or fluid prevail.

Technical Data

Dial size: 2 1/2" (63 mm)
Connection: 1/4" NPT, back or bottom
Scales:
0-6, 10, 16, 25 and 40 bar
0-90, 140, 230, 350 and 600 psi
Accuracy: ± 1.6% of full scale dial
Maximum temperature: 60°C (140°F)
Standard materials:
Case: Stainless Steel 304
Window: Extruded acrylic sheet
Seal: Neoprene
Dampening fluid: Glycerin
Socket: Brass
Bourdon tube: Bronze
Dial & pointer: Aluminum

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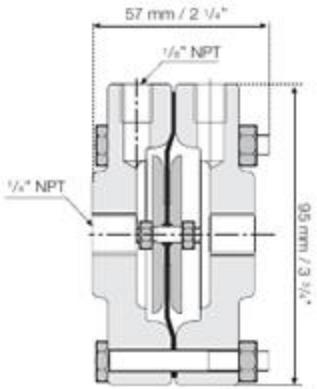
Model 35d

Pressure Sensing Separation Diaphragm

This device is used to protect the pressure sensing chambers of pilots (and pressure gauges) from highly corrosive fluids, high viscosity fluids, or fluids with suspended solids.
It has two chambers separated by a diaphragm. The sensed system pressure is introduced to one chamber, applying force on the diaphragm that "transmits" it to the second chamber. The second chamber and the pilot sensing chamber are connected and are both filled with a non-aggressive, stable fluid.

Technical Data

Pressure rating: 25 bar (350 psi)
Standard materials:
Body: Stainless Steel 303
Diaphragm: NBR, nylon fabric reinforced
Optional materials:
Metal parts: Stainless Steel 316
Seals: FPM
Ports: 1/4" NPT
Air venting ports: 1/8" NPT
Maximum temperature: 80°C (180°F)



Weight: 2.2 Kg / 4.9 lbs.

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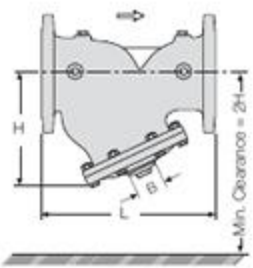
Technical Data

Dimensions and Weights

Size		L		L1		H		W		W1		B
mm	inch	mm	inch	mm	inch	mm	inch	kg	lbs	kg	lbs	mm
40	1½"	205	8.1	205	8.1	125	4.9	6.5	14.3	7.8	17.2	½"
50	2"	210	8.3	210	8.3	125	4.9	8.0	17.6	10	22.0	
65	2½"	222	8.7	222	8.7	125	4.9	10.4	22.9	12.8	28.2	
80	3"	250	9.8	264	10.4	170	6.7	17	37.5	20	44	1½"
100	4"	320	12.6	335	13.2	210	8.3	28	61.7	34	75	
150	6"	415	16.3	433	17.0	270	10.6	48	106	58	128	2"
200	8"	500	19.7	524	20.6	330	13.0	75	165	95	210	
250	10"	605	23.8	637	25.1	420	16.5	125	276	153	337	
300	12"	725	28.5	762	30.0	480	18.9	225	496	268	586	
350	14"	733	28.9	767	30.2	480	18.9	235	518	288	635	
400	16"	990	39.0	1024	40.3	620	24.4	535	1180	590	1300	3"
450	18"	1000	39.4	1030	40.5	620	24.4	670	1477	735	1620	
500	20"	1100	43.3	1136	44.7	620	24.4	760	1675	835	1840	

L,W – ISO 16 & 16, ANSI 150
L1,W1 – ISO 25, ANSI 300
"L": ISO standard lengths available
B – Blow off port



Basket Hole Diameter (mm)
Stainless Steel 304 (Standard)

2"	3-4"	6-20"
1.5	3.0	5.0

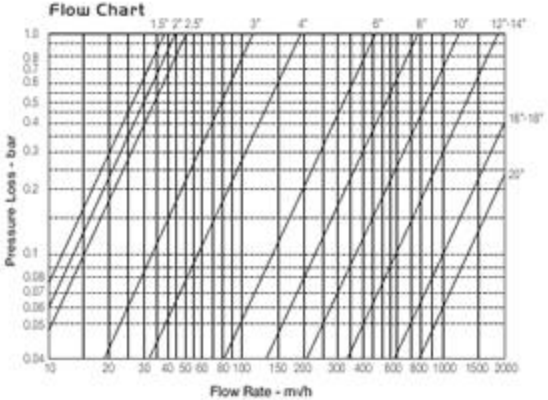
Stainless Steel 316 (Optional)

2-6"	8-20"
2.0	3.0

Specifications

Patterns: "Y" (globe) & angle
Size Range: 1"⅛ - 20" (40-500 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: Ductile Iron
Cover: Steel
Screen / Basket: Stainless Steel 304
Seals: NBR
Coating:
Fusion Bonded Epoxy, RAL 5005 (Blue)
NSF & WRAS approved or Electrostatic Polyester Powder, RAL 6017 (Green)

Flow Chart



How to Order

Sector	Size	Primary Feature	Pattern	Body Material	End Connections	Coating	Additonal Attributes
WW	6"	70F*	Y	C	16	EB	mN
Waterworks	1"⅛ - 20"	Strainer	Oblique (up to 20°) Y Angle (up to 18°) A	Ductile Iron Standard C Cast Steel S St. Steel 316 N	ISO-16 16 ISO-25 25 ANSI-150 A5 ANSI-300 A3 JIS-16 J6 JIS-20 J2	Polyester Green PG Polyester Blue PB Epoxy FB Blue EB Uncoated UC	St. Steel 316 bolts & nuts m St. Steel 316 screen N

* For PN 40 Strainer, order Model 80F

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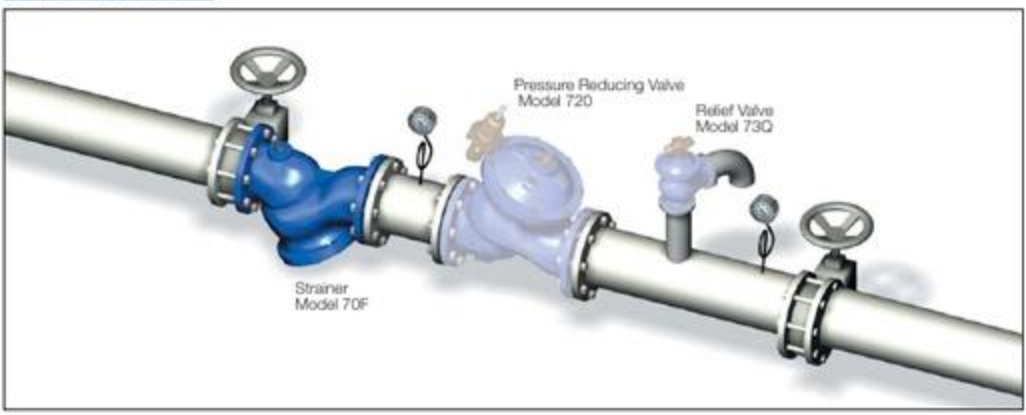
Strainer

The BERMAD 70F Strainer is designed to remove foreign matter such as stones, sticks etc. from the pipeline.
It is recommended to install the Strainer upstream from control valves, flow meters and other system appliances.
High Pressure Strainer Model 80F is also available.

- Large trap capacity
- Low pressure loss
- Blow-off port for easy cleaning

Typical application



Maintenance Tips

- It is recommended to install a full-bore Ball Valve at the Strainer blow-off port for easy cleaning.
- Should disassembly for maintenance be required; leave the lower cover-screw half-open. This way it can serve as an axis for pivoting the Strainer cover, easing maintenance.

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Valve Position Indicator Assembly

The Position Indicator provides a visual indication of valve position and regulation behavior.

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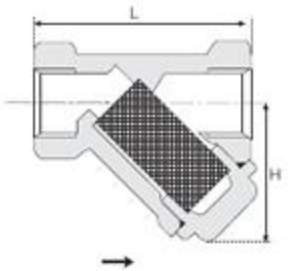
"Y" Strainer

The "Y" Strainer is used for filtration of control fluid with standard potable water quality and standard maintenance.



Technical Data

Pressure rating: 25 bar (350 psi)
Standard materials:
Body & cover: Brass
Screen: Stainless Steel 316
Seal: Fiber
Optional materials: Stainless Steel body & cover
Filter element: 500 micron (35 mesh)
Ports: 1/4", 3/8" & 1/2" NPT, 1" BSP
Maximum temperature: 140°C (285°F)

		1/4"		3/8"		1/2"	
		mm	inch	mm	inch	mm	inch
Brass	H	39.5	1 9/16"	39.5	1 9/16"	39.5	1 9/16"
	L	53	2 1/16"	53	2 1/16"	53	2 1/16"
St. St.	H	47	1 7/8"	47	1 7/8"	50	2"
	L	57	2 1/4"	57	2 1/4"	61	2 7/16"

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Accessories

- 2-Way Solenoid Valve Burkert 281 Series
- 2-Way Solenoid Valve Burkert 404 Series
- 3-Way Solenoid Valve Burkert 330 Series
- 3-Way Solenoid Valve Burkert 311 Series
- Hydraulic Relay Valve (HRV) Model 50
- 3-Way Accelerator Model 54
- 3-Way Double Chambered Accelerator Model 58
- 3-Way Double Chambered High Capacity Accelerator Model 58HC
- Needle Valve
- One-Way Flow Control
- Check Valve
- "Y" Strainer / Filter
- In-Line Filter
- Large Control Filter
- 2-Way Ball Valve
- 3-Way Ball Valve
- Manometer Ball Valve
- Pressure Gauge
- Pressure Sensing Separation Diaphragm Model 35d
- Limit Switch Assemblies
- Valve Position Indicator Assembly
- Flow Stem / Mechanical Closure
- Strainer Model 70F

Water Control Solutions

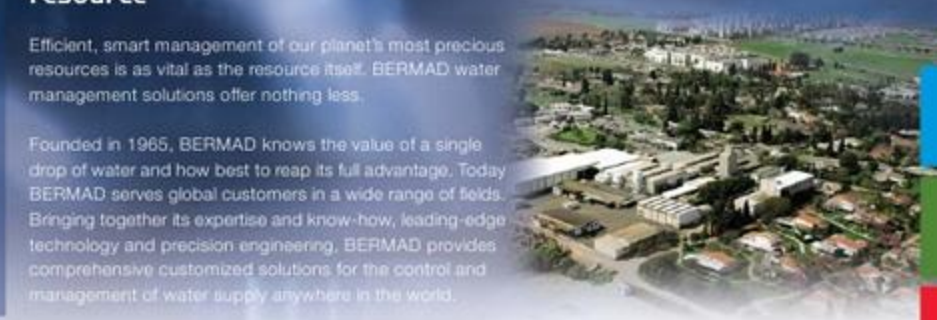
BERMAD

BERMAD Company Profile

Managing the world's most precious resource

Efficient, smart management of our planet's most precious resources is as vital as the resource itself. BERMAD water management solutions offer nothing less.

Founded in 1965, BERMAD knows the value of a single drop of water and how best to reap its full advantage. Today BERMAD serves global customers in a wide range of fields. Bringing together its expertise and know-how, leading-edge technology and precision engineering, BERMAD provides comprehensive customized solutions for the control and management of water supply anywhere in the world.



BERMAD - Provider of Solutions

Based on expertise that comes from years of hands-on experience, BERMAD has developed state-of-the-art control valves and related products, along with comprehensive system solutions for a range of water management needs. Its main areas of activity include:

Waterworks

BERMAD offers management systems for the supply and treatment of water and wastewater covering a range of applications from high-rise buildings, and whole municipalities, to comprehensive water systems for industrial facilities, hydroelectric power stations, and private sector projects.

Irrigation

A comprehensive line of water control products provides system solutions for the full range of agricultural irrigation applications including drip irrigation, pivot systems, sprinklers, micro-jets and greenhouse irrigation, as well as covering commercial and residential gardening irrigation needs.

Fire Protection

Automatic control valves with a range of operation modes are the vital components in fire protection systems for oil refineries, petro-chemical plants and public buildings.

Petroleum

BERMAD is a major supplier of automatic, self actuated control valves for the petroleum industry. These components are used in distribution terminals, cross-country pipelines and petroleum tank farms.

Water metering

BERMAD solutions are adapted to the needs of bulk and domestic water metering in supply systems, and include both remote water metering read-out, and pre-payment systems.

BERMAD High End Solutions

Hydraulic Control Valves

Product Lines

Bermad's wide range of control valves are divided into several main series:

- 700, 800 and 400 Series - Hydraulic, diaphragm and piston actuated control valves for multi-purpose applications. The Series ranges from 3/4"; DN20 to 32"; DN800 with working pressures up to 40 bar; 600 psi.
- 900 Series - Hydrometers combining control valve and water meter for irrigation applications and municipal water control systems
- 700E and 400E - Deluge valves for fire protection applications
- Solenoid-operated, plastic valves for all kinds of irrigation and water treatment applications.
- 100 and 200 Series ranging from 3/4"; DN20 to 4"; DN100
- AF 700 Series - Digital control valves for petroleum applications
- Water meters – For bulk and domestic applications

BERMAD products are suitable for most water and fluid supply applications, meeting control needs such as:

- Pressure reducing and sustaining
- Flow and level control
- Pump, surge and burst control
- Solenoid, electronic and multi-step digital operation

Main modes of operation include electric and hydraulic On/Off operation, as well as hydraulic pre-set for modulation.

BERMAD – Some vital statistics

- Main manufacturing facilities - With 35,000 sq.m. of open space, BERMAD's main manufacturing facilities include a 15,000 sq.m. enclosed interior area.
- Personnel includes:
  - 350 employees in the main manufacturing facility, and 100 more in subsidiary companies
  - 15 R&D engineers and 25 skilled technicians
  - 45 marketing and marketing support personnel
- Main departments include: Assembling, Hydraulic Testing, Painting, Plastic Injection, Machining & Lathing, Storage & Packaging, Shipping & Receiving.
- The Information Technology Department, based on a computerized integrated system (Oracle ERP), provides full control and management at all levels of production processing, marketing, and shipment flow.
- Quality Assurance throughout the manufacturing process keeps BERMAD products in compliance with ISO 9001-2000, in addition to a range of international quality and ecology standards such as NSF, CT, OVGW, DVGW, BELGAQUA, WRAS, as well as being UL Listed and FM Approved, while ensuring efficiency, rapid turnaround and always-on-schedule delivery.

BERMAD - A Worldwide Presence

With 9 subsidiaries throughout the world, and operations in over 80 countries on 6 continents, BERMAD has a formidable global presence. Its worldwide customer training facilities and parts distribution networks ensure uninterrupted customer service. Making a significant impact on the world arena, BERMAD has taken part in numerous major projects.

Project references:

Waterworks:

BERMAD has been supplying hydraulic control valves and system solutions to private water companies and municipalities worldwide. Among BERMAD's regular municipal clientele are Los Angeles (CA), Sydney (Australia), Manchester (UK), Milan (Italy), Jerusalem (Israel), Scottsdale (AZ), Sao Paulo (Brazil), Mexico City and many others.
In addition, BERMAD has supplied water management solutions based on its hydraulic control valves to high-rise buildings, hotels, shopping malls, office complexes, hospitals, and industrial facilities in major cities throughout the world, including Las Vegas, London, Brisbane, Manila, Bangkok, Shanghai, Eilat and more.

Irrigation:

- Car Boy Project, Sicily - 30,000 Ha = 30,000 irrigation valves
- C.R-Genil Cabra, Spain - Large scale irrigation scheme
- Masangano, Brazil - Water distribution network and large-scale irrigation project

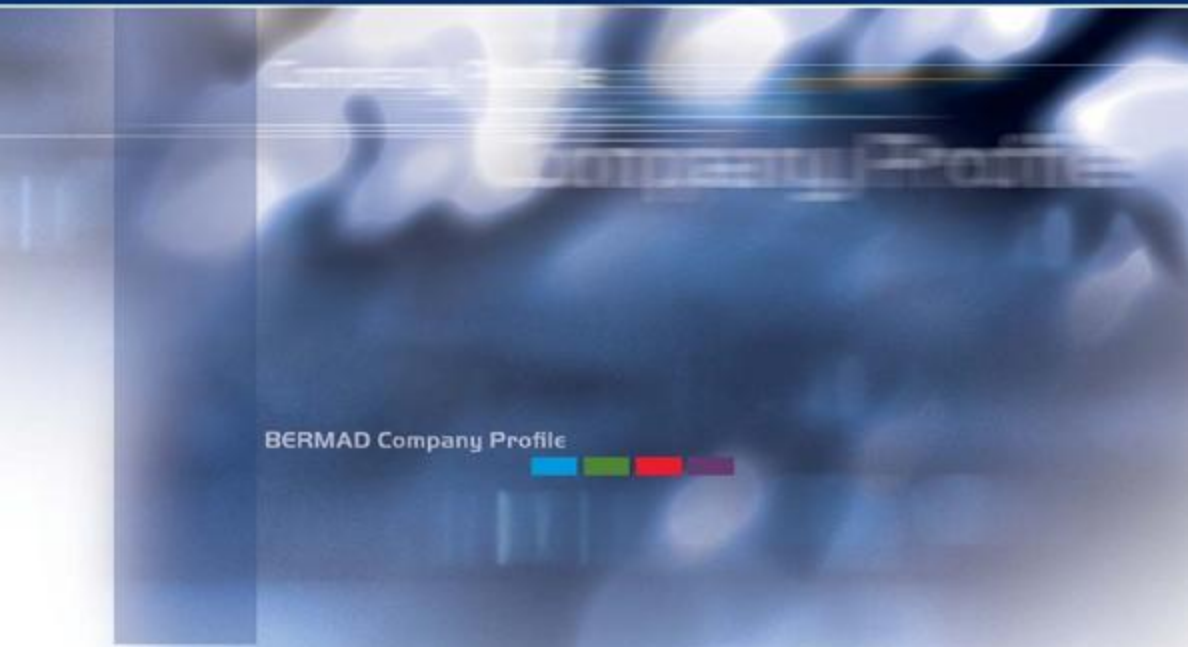
Other large-scale international irrigation projects have been executed in the USA, Spain, Morocco, Italy, Brazil, South Africa, Australia, Japan and more.

Fire Protection:

- Euro-Tunnel - La Manche tunnel
- Troll Project - The largest gas supply project in Europe
- Malpensa - Milan International Airport
- Mount Piper - Power Station, Sydney, Australia
- Guangzhou - Exhibition Center, China

Petroleum:

- Man-Made Project in India - The world's biggest white oil terminal
- Integrator - ABB Norway - 450 units of BERMAD digital control valves



Precision Engineering - A BERMAD Commitment

Comprehensive fluid management systems are only as effective as their smallest component, each part making a critical contribution to the whole. That's why BERMAD systems are based on control components that are designed, developed and manufactured in-house.

Dedication to precision engineering is expressed in BERMAD's ability to adapt solutions to any customer need; to constantly integrate the latest, most reliable manufacturing techniques; and to provide every customer with the most comprehensive commercial and technical support in the world.

BERMAD ...a global leader in managing the world's most precious resources

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BERMAD Waterworks

High-Rise Buildings have unique requirements, which must be taken into account when designing and installing their water supply and distribution systems. BERMAD solutions give careful consideration to issues such as:

- While single source supply is common, supply cut-off is unacceptable.
- Water damage in a high-rise building can be extremely costly.
- Valves are often located in close proximity to prestigious residential and office space.
- The main supply line is exposed to increasingly high head at lower zones.
- A multiplicity of systems requires integration and control.
- Maintenance personnel are not always skilled with control valves.

Luxury Hotels have all the special requirements of high-rise buildings, with the additional requirement of catering to high water consumption facilities such as jacuzzis, spas, swimming pools, artificial waterfalls and fountains. These systems typically handle aggressive water with corrosive materials, while needing to operate very accurately under low pressure conditions. Any system failure is a breach of customer service, which in the hospitality industry is totally unacceptable.

All the above systems require a multitude of valves with a variety of control features, construction materials and pressure ratings. BERMAD's double chambered 700 and 800 Series control valves are built from optimal materials to provide long term operating reliability under extremes of pressure, while allowing easy in-line maintenance. The culmination of BERMAD's experience and know-how, the 700 and 800 Series ensures a smooth and reliable water supply, with efficient and integrated system operation backed by BERMAD's professional engineering support.

BERMAD is a world leader in its field with major market shares in North and South America, Europe, Asia, Africa, and Australia. The breadth of BERMAD's activities, through its subsidiaries, representatives and customers, allows us to stay close to our markets, continuing to increase and develop one of our most important assets - the accumulated know-how covering a range of systems, applications, and ideal solutions customized to every need.

This catalog is intended to be a useful working tool for project investors, consulting engineers, construction supervisors, installation contractors, and maintenance personnel.

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BERMAD in Waterworks & Industrial Applications

At the heart of BERMAD's waterworks activities, covering every water supply and distribution system application, is the BERMAD 700 Series line of control valves and its high pressure version, the 800 Series. Developed by BERMAD's creative engineering and based on cutting edge technologies, these Series offer a variety of control features from pressure reducing, relief and sustaining; through level, pump, surge, flow and burst control; to solenoid and electronic control. Optimally designed and expertly integrated by BERMAD engineers into systems providing just the right models and configurations, the BERMAD 700 & 800 Series control valves meet every national, regional, and municipal water supply need, as well as the special needs of industrial facilities, high-rise and public buildings, and luxury hotels.

For National, Regional and Municipal Distribution Networks, system design and operation starts with careful examination of expected flow and pressure ranges, the parameters that determine major system components, including pump stations, reservoirs, supply lines, water treatment plants and desalination systems. These components are then integrated into pressure zones with leakage reduction means, to ensure a continuous, reliable and smooth supply of water through an efficient and cost effective network.

For Industrial Facilities, a reliable, uninterrupted supply of water is vital. When production processes rely on a high flow of high quality water at a constant flow and temperature, any interruption or deviation can be devastatingly costly. Where fire hazards are in close proximity to workers, expensive equipment, or residential areas, absolutely reliable large scale, self supply, backup systems are a must.

Fire Protection Approvals & Certifications

UL LISTED	UNDERWRITERS LABORATORIES USA	Special System Water Control Valves, Deluge Type (VLFT) Special System Water Control Valves, Pressure Reducing Type (VLMT) Special System Water Control Valves, Double Interlock Type (VLJH)
FM APPROVED	FACTORY MUTUAL RESEARCH CORPORATION USA	Pressure Relief Valves Process Control Valves
VdS	VDS SCHADENVERHUETUNG GERMANY	Fire Protection Valves
Lloyd's Register TA	LLOYD'S REGISTER UK	Type Approval for Hydraulically Operated Valves for Fire Protection System Fire Test Certificate
ABS TYPE APPROVAL PROGRAM	AMERICAN BUREAU OF SHIPPING USA	Type Approval (RQS) Type Approval for Hydraulically Operated Valves for Fire Protection System Fire Test Certificate

Waterworks Standards, Approvals & Certifications

IQNet – ISO 9001-2000	INTERNATIONAL	Certified quality system
WRAS Water Regulations Advisory Scheme	WRAS, UK	The product complies with the Water Regulation Advisory Scheme of UK and BS 6920
DVGW Zertifizierungsstelle	DVGW, Germany	Compliance with the European Standard EN 1074 – Valves for water supply.
AFNOR CERTIFICATION Groupe AFNOR	ACS, France	Tests are based on the French standard XPP 41-250-1 and -2 adapted. Acceptance criteria are defined in the French circular dated 25 Nov 2002.
GOSSTANDART OF RUSSIA	GOST, Russia	The product complies with the Russian Federation Std. GOST R 50460
ÖVGW	ÖVGW, Austria	The product complies with the criteria of the Austrian Std. ÖNORM B 5014 and EN 1074 – Valves for water supply.
BELGAQUA	BELGAQUA, Belgium	The product complies with the Belgian Standards for materials in contact with drinking water
NSF	NSF 61, USA	The product complies with the NSF/ ANSI 61 Std. – Valves for Water Supply

Burst Control Valve

Burst Control Valves minimize water waste, land erosion and the damage that can be caused by pipeline failures or equipment malfunction. When sensing flow in excess of setting, or significantly reduced downstream pressure, the Burst Control Valve shuts off drip tight and locks closed until manually reset.

- **790-M – Burst Control Valve**
- **792-U – Burst Control and Pressure Reducing Valve**

Check Valves

When reverse flow is to be avoided, especially for pumping applications and water distribution networks, Check Valves allow flow in only the design specified direction.

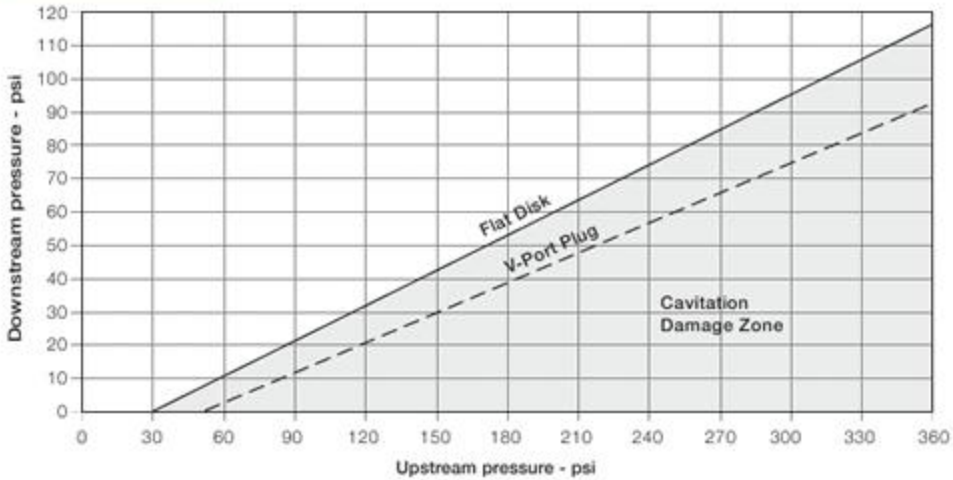
- **70N – Check Valve, Lift Type**
- **760-03-V – Non-Slam Hydraulic Check Valve**

Electronic Control Valve

Electronic Control Valves are modulating valves that are electrically activated by signals from an electronic controller to provide accurate pressure, level, flow and/or temperature control. These valves combine the advantages of excellent modulating, line pressure driven, hydraulic valve and with the sophistication and numerous possibilities of programmable electronic controls.

- **718-03 – Electronic Control Valve**

Cavitation Guide



Cavitation

The cavitation phenomenon has a significant affect on control valve and system performance.
Cavitation may damage the valve and piping by the affects of erosion and vibration. Cavitation also generates noise and may limit and ultimately choke the flow.
As the pressure differential across the valve increases, the static pressure of the flow passing through the throttling area of the valve (Vena Contracta) drops sharply.
When the fluid's static pressure reaches liquid vapor pressure, vapor cavities (bubbles) form and grow until they violently implode by the recovered pressure downstream to the valve seat.
The implosion of these cavities generates high-pressure surges, micro jets and intensive heat, which erode valve components and downstream piping. In its final stage, cavitation flashes and chokes the flow.
The above Cavitation Guides for Bermad 700 Series valves are based on the formula commonly used in the valve industry:

$\sigma = (P2-Pv) / (P1-P2)$

Where:

σ = Sigma, cavitation index, dimensionless
P1 = Upstream pressure, absolute
P2 = Downstream pressure, absolute
Pv = Liquid vapor pressure, absolute
(Water, 18°C = 0.02 bar-a) ; 65°F = 0.3 psi-a)

Use these guides and your applications upstream and downstream pressures to determine whether their intersection lies in or out of the cavitation damage zone.
Considerations to avoid cavitation damage:

A) Reduce system pressure in stages designing each pressure stage to be above cavitation conditions.
B) Consider using other valve selection criteria
   a. Valve body and plug type
   b. Valve size
   c. Valve material

Notes:

1. An alternate cavitation index formula introduced by ISA is:
   $\sigma_{ISA} = (P1-Pv) / (P1-P2)$ which equals $\sigma+1$
2. The above charts should be considered only as a general guide.
3. For optimum system and control valve application please consult Bermad.

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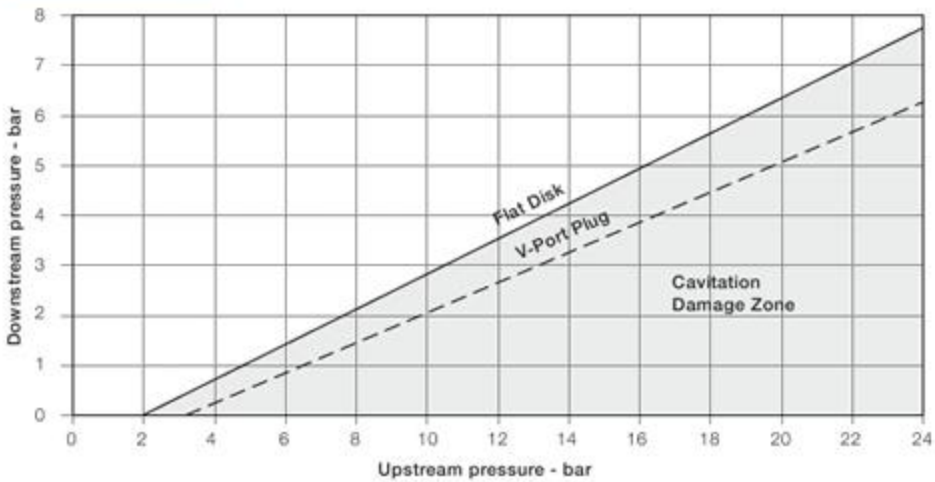
SI Metric

Cavitation Guide



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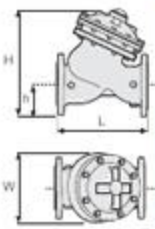
US 700 English

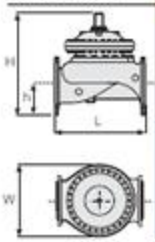
Flanged

Y Pattern



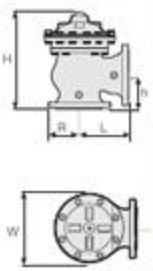
	inch	1¹/₂"	2"	2¹/₂"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"
ANSI 125 ; 150	L	8.1	8.1	8.3	9.8	12.6	16.3	19.7	23.8	28.5	28.9	39.0	39.4	43.3
	W	6.1	6.1	7.0	7.9	8.8	12.6	15.4	18.9	21.7	21.7	29.1	29.1	29.1
	h	3.1	3.3	3.7	3.9	4.5	5.6	6.8	8.0	9.5	10.6	11.8	12.6	14.1
	H	9.4	9.6	10.1	12.0	14.4	19.4	23.0	28.5	33.1	34.1	43.6	44.4	45.9
	Weight (lb)	20	23	29	49	82	165	276	478	816	840	1865	2083	2121
ANSI 250 ; 300	L	8.1	8.3	8.7	10.4	13.2	17.0	20.6	25.1	30.0	30.2	40.3	40.5	44.7
	W	6.1	6.5	7.3	8.1	9.8	12.6	15.4	18.9	21.7	22.4	29.1	29.1	29.5
	h	3.1	3.3	3.7	4.1	5.0	6.3	7.5	8.8	10.3	11.6	12.8	14.1	15.3
	H	9.4	9.6	10.1	12.4	14.9	20.0	23.7	29.2	33.8	35.2	44.6	45.9	47.1
	Weight (lb)	22	27	33	55	95	187	322	540	904	957	1984	2132	2174

Globe Pattern



	inch	24"	28"	30"	32"
ANSI 125 ; 150	L	57	65	70	73
	W	49	49	49	49
	h	18.5	19	20.5	21.8
	H	77	78	79.3	80.6
	Weight (lb)	7150	8140	8580	9020
ANSI 250 ; 300	L	59	65	70	73
	W	49	49	49	49
	h	18.5	19	20.5	21.8
	H	77	78	79.3	80.6
	Weight (lb)	7700	8140	8580	9020

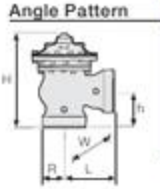
Angle Pattern



	inch	1¹/₂"	2"	2¹/₂"	3"	4"	6"	8"	10"	12"	14"	16"	18"
ANSI 125 ; 150	L	4.9	4.9	5.9	6.0	7.5	8.9	10.4	12.6	15.6	15.7	17.7	17.7
	W	6.1	6.1	7.0	7.9	8.7	12.6	15.4	18.9	21.7	21.7	29.1	29.1
	R	3.1	3.3	3.7	3.9	4.5	5.6	6.8	8.0	9.8	10.4	11.8	12.6
	h	3.3	3.3	4.3	4.0	5.0	6.0	8.0	8.6	10.7	11.0	14.5	14.5
	H	8.9	8.9	9.9	11.1	13.5	17.4	21.5	24.9	30.6	30.7	42.6	42.6
	Weight (lb)	21	22	27	47	77	157	260	452	772	816	1764	1808
ANSI 250 ; 300	L	4.9	4.9	5.9	6.3	7.9	9.2	10.9	13.2	16.3	16.5	18.4	18.4
	W	6.5	6.5	7.3	8.1	9.8	12.6	15.4	18.9	21.7	21.7	29.1	29.1
	R	3.1	3.3	3.7	4.1	5.0	6.3	7.5	8.8	10.3	11.5	12.8	14
	h	3.3	3.3	4.3	4.3	5.3	6.5	8.5	9.3	11.6	11.8	15.2	15.2
	H	8.9	8.9	9.9	11.3	13.8	17.9	22.0	25.6	31.3	31.5	43.3	43.3
	Weight (lb)	24	25	30	51	90	179	304	514	860	937	1885	1918

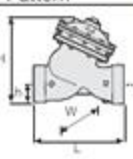
Threaded

Angle Pattern



	inch	2"	2¹/₂"	3"
BSP ; NPT	L	4.8	5.5	6.3
	W	4.8	4.8	6.4
	R	1.6	1.9	2.2
	h	3.3	4.0	4.5
	H	8.9	9.5	11.6
	Weight (lb)	12	15	33

Y Pattern



	inch	1¹/₂"	2"	2¹/₂"	3"
BSP ; NPT	L	6.1	6.1	8.3	9.8
	W	4.8	4.8	4.8	6.4
	h	1.6	1.6	8.2	2.2
	H	7.9	8.0	8.2	10.4
	Weight (lb)	12	12	18	37

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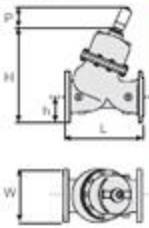
PT776001-09 00

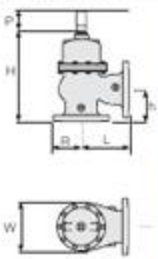
US 800 English

Y Pattern



	inch	1½"	2"	2½"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"
ANSI 150	L	8.1	8.1	8.3	9.8	12.6	16.3	19.7	23.8	28.5	28.9	39.0	39.4	43.3
	W	6.1	6.1	7.0	7.9	8.8	12.6	15.4	18.9	21.7	21.7	29.1	29.1	29.1
	h	3.1	3.3	3.7	3.9	4.5	5.6	6.8	8.0	9.5	10.6	11.8	12.6	14.1
	H	10.2	10.4	10.9	12.9	16.1	20.7	25.6	30	37.1	38.1	45.4	46.2	47.7
	P	N/A	N/A	N/A	N/A	N/A	5.3	5.3	5.6	6.1	6.1	7.5	7.5	7.5
	Weight (lb)	24	29	35	62	106	207	356	598	1001	1060	2200	2363	2411
ANSI 300	L	8.1	8.3	8.7	10.4	13.2	17.0	20.6	25.1	30.0	30.2	40.3	40.5	44.7
	W	6.1	6.5	7.3	8.1	9.8	12.6	15.4	18.9	21.7	22.4	29.1	29.1	29.5
	h	3.1	3.3	3.7	4.1	5.0	6.3	7.5	8.8	10.3	11.6	12.8	14.1	15.3
	H	10.2	10.4	10.9	13.1	16.6	21.3	26.2	30.8	37.8	39.2	46.4	47.6	48.9
	P	N/A	N/A	N/A	N/A	N/A	5.3	5.3	5.6	6.1	6.1	7.5	7.5	7.5
	Weight (lb)	26	33	40	70	123	233	418	675	1111	1208	2354	2409	2484

Angle Pattern



	inch	1½"	2"	2½"	3"	4"	6"	8"	10"	12"	14"	16"	18"
ANSI 150	L	4.9	4.9	5.9	6.0	7.5	8.9	10.4	12.6	15.6	15.7	17.7	17.7
	W	6.1	6.1	7.0	7.9	8.7	12.6	15.4	18.9	21.7	21.7	29.1	29.1
	R	3.1	3.3	3.7	3.9	4.5	5.6	6.8	8.0	9.8	10.4	11.8	12.6
	h	3.3	3.3	4.3	4.0	5.0	6.0	8.0	8.6	10.7	11.0	14.5	14.5
	H	9.9	10.4	10.7	12.1	15.4	18.7	24.4	28.2	35.9	36.0	45.0	45.0
	P	N/A	N/A	N/A	N/A	N/A	5.6	5.6	6.1	6.1	6.1	7.7	7.7
	Weight (lb)	24	29	35	57	101	198	337	570	953	1010	2090	2244
ANSI 300	L	4.9	4.9	5.9	6.3	7.9	9.2	10.9	13.2	16.3	16.5	18.4	18.4
	W	6.5	6.5	7.3	8.1	9.8	12.6	15.4	18.9	21.7	21.7	29.1	29.1
	R	3.1	3.3	3.7	4.1	5.0	6.3	7.5	8.8	10.3	11.5	12.8	14
	h	3.3	3.3	4.3	4.3	5.3	6.5	8.5	9.3	11.6	11.8	15.2	15.2
	H	9.9	10.4	10.7	12.4	15.7	19.3	24.9	28.9	36.6	36.8	45.7	45.7
	P	N/A	N/A	N/A	N/A	N/A	5.6	25.6	6.1	6.1	6.1	7.7	7.7
	Weight (lb)	26	33	40	66	119	222	394	642	1058	1151	2237	2312

US 700 & 800 English

Control Chamber Displacement Volume (gallon)

Sizes	1½"-2½"	3"	4"	6"	8"	10"	12"-14"	16"-20"	24"-32"
700 Series	0.04	0.06	0.12	0.57	1.19	2.25	3.28	7.88	25.9
800 Series	0.01	0.03	0.08	0.29	0.61	1.06	2.12	4.95	-

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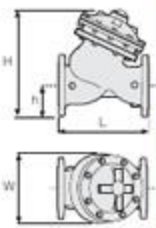
SI 700 Metric

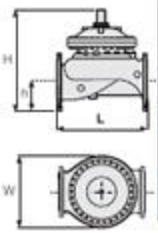
Flanged

Y Pattern



	mm	40	50	65	80	100	150	200	250	300	350	400	450	500
ISO PN 10 ; 16	L	205	210	222	250	320	415	500	605	725	733	990	1000	1100
	W	155	165	178	200	223	320	390	480	550	550	740	740	740
	h	78	83	95	100	115	143	172	204	242	268	300	319	358
	H	239	244	257	305	366	492	584	724	840	866	1108	1127	1167
	Weight (Kg)	9.1	10.6	13	22	37	75	125	217	370	381	846	945	962
ISO PN 20 ; 25	L	205	210	222	264	335	433	524	637	762	767	1024	1030	1136
	W	155	165	185	207	250	320	390	480	550	570	740	740	750
	h	78	83	95	105	127	159	191	223	261	295	325	357	389
	H	239	244	257	314	378	508	602	742	859	893	1133	1165	1197
	Weight (Kg)	10	12.2	15	25	43	85	146	245	410	434	900	967	986

Globe Pattern



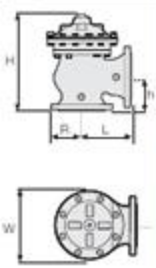
Length according to EN 558-1

	mm	600	700	750	800
ISO PN 10 ; 16	L	1450	1650	1750	1850
	W	1250	1250	1250	1250
	h	470	490	520	553
	H	1965	1985	2015	2048
	Weight (Kg)	3250	3700	3900	4100
ISO PN 20 ; 25	L	1500	1650	1750	1850
	W	1250	1250	1250	1250
	h	470	490	520	553
	H	1965	1985	2015	2048
	Weight (Kg)	3500	3700	3900	4100

Y Pattern - Length according to EN 558-1

DN	50	80	100	150	200	250	300
L	230	310	350	480	600	730	850
W	165	200	235	320	390	480	550
h	82.5	100	118	150	180	213	243
H	244	305	369	500	592	733	841
Weight (Kg)	9.7	21	31	70	115	198	337
L	230	310	350	480	600	730	850
W	165	200	235	320	390	480	550
h	82.5	100	118	150	180	213	243
H	244	305	369	500	592	733	841
Weight (Kg)	9.7	21	31	70	115	198	337

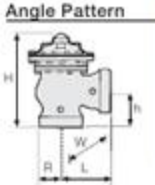
Angle Pattern



	mm	40	50	65	80	100	150	200	250	300	350	400	450
ISO PN 10 ; 16	L	124	124	149	152	190	225	265	320	396	400	450	450
	W	155	155	178	200	222	320	390	480	550	550	740	740
	R	78	83	95	100	115	143	172	204	248	264	299	320
	h	85	85	109	102	127	152	203	219	273	279	369	370
	H	227	227	251	281	342	441	545	633	777	781	1082	1082
	Weight (Kg)	9.5	10	12	21.5	35	71	118	205	350	370	800	820
ISO PN 20 ; 25	L	124	124	149	159	200	234	277	336	415	419	467	467
	W	165	165	185	207	250	320	390	480	550	550	740	740
	R	78	85	95	105	127	159	191	223	261	293	325	358
	h	85	85	109	109	135	165	216	236	294	299	386	386
	H	227	227	251	287	350	454	558	649	796	801	1099	1099
	Weight (Kg)	11	11.5	13.5	23	41	81	138	233	390	425	855	870

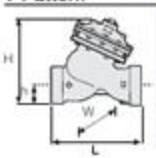
Threaded

Angle Pattern



	mm	50	65	80
BSP ; NPT	L	121	140	159
	W	122	122	163
	R	40	48	55
	h	83	102	115
	H	225	242	294
	Weight (Kg)	5.5	7	15

Y Pattern



	mm	40	50	65	80
BSP ; NPT	L	155	155	212	250
	W	122	122	122	163
	h	40	40	48	56
	H	201	202	209	264
	Weight (Kg)	5.5	5.5	8	17

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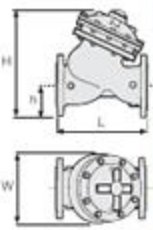
PT7000-06 06

SI 700 Metric — European Standard (EN 558-I)

Flanged

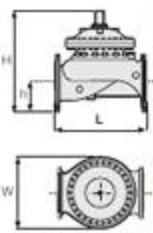
Y Pattern



	DN	50	80	100	150	200	250	300	350	400	450	500	40	65
PN 10; 16	L*	230	310	350	480	600	730	850	733	990	1000	1100	205	222
	W	165	200	235	320	390	480	550	550	740	740	740	155	190
	h	82.5	100	118	150	180	213	243	268	300	319	358	78	95
	H	244	305	369	500	592	733	841	866	1108	1127	1167	239	257
	Weight (Kg)	9.7	21	31	70	115	198	337	381	846	945	962	9.1	13
PN 25	L*	230	310	350	480	600	730	850	767	1024	1030	1136	205	222
	W	165	200	235	320	390	480	550	570	740	740	750	155	190
	h	82.5	100	118	150	180	213	243	295	325	357	389	78	95
	H	244	305	369	500	592	733	841	893	1133	1165	1197	239	257
	Weight (Kg)	9.7	21	31	70	115	198	337	434	900	967	986	10	15

* Length according to EN 558-1 for DN 50, 80, 100, 150, 200, 250 & 300.

G Pattern



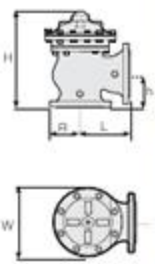
	DN	600	700	750	800
PN 10 ; 16	L*	1450	1650	1750	1850
	W	1250	1250	1250	1250
	h	470	490	520	553
	H	1965	1985	2015	2048
	Weight (Kg)	3250	3700	3900	4100
PN 25	L	1500	1650	1750	1850
	W	1250	1250	1250	1250
	h	470	490	520	553
	H	1965	1985	2015	2048
	Weight (Kg)	3500	3700	3900	4100

* Length according to EN 558-1.

On request (Y Pattern)

DN	50	80	100	150	200	250	300
L	210	250	320	415	500	605	725
W	165	200	229	320	390	480	550
h	83	100	115	143	172	204	242
H	244	305	366	492	584	724	840
Weight (Kg)	10.6	22	37	75	125	217	370
L	210	264	335	433	524	637	762
W	165	210	254	320	390	480	550
h	83	105	127	159	191	223	261
H	244	314	378	508	602	742	859
Weight (Kg)	12.2	25	43	85	146	245	410

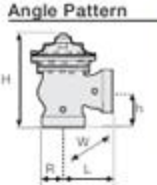
Angle Pattern



	DN	40	50	65	80	100	150	200	250	300	350	400	450
PN 10 ; 16	L	124	124	149	152	190	225	265	320	396	400	450	450
	W	155	155	178	200	222	320	390	480	550	550	740	740
	R	78	83	95	100	115	143	172	204	248	264	299	320
	h	85	85	109	102	127	152	203	219	273	279	369	370
	H	227	227	251	281	342	441	545	633	777	781	1082	1082
	Weight (Kg)	9.5	10	12	21.5	35	71	118	205	350	370	800	820
PN 25	L	124	124	149	159	200	234	277	336	415	419	467	467
	W	165	165	185	207	250	320	390	480	550	550	740	740
	R	78	85	95	105	127	159	191	223	261	293	325	358
	h	85	85	109	109	135	165	216	236	294	299	386	386
	H	227	227	251	287	350	454	558	649	796	801	1099	1099
	Weight (Kg)	11	11.5	13.5	23	41	81	138	233	390	425	855	870

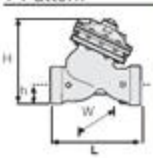
Threaded

Angle Pattern



	DN	50	65	80
BSP ; NPT	L	121	140	159
	W	122	122	163
	R	40	48	55
	h	83	102	115
	H	225	242	294
	Weight (Kg)	5.5	7	15

Y Pattern



	DN	40	50	65	80
BSP ; NPT	L	155	155	212	250
	W	122	122	122	163
	h	40	40	48	56
	H	201	202	209	264
	Weight (Kg)	5.5	5.5	8	17

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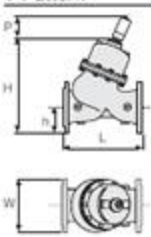
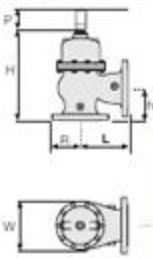
SI 800 Metric

Y Pattern



	mm	40	50	65	80	100	150	200	250	300	350	400	450	500
ISO PN 10, 16	L	205	210	222	250	320	415	500	605	725	733	990	1000	1100
	W	156	166	190	200	229	286	344	408	484	536	600	638	716
	h	78	83	95	100	115	143	172	204	242	268	300	319	358
	H	260	265	278	327	409	526	650	763	942	969	1154	1173	1211
	P	N/A	N/A	N/A	N/A	N/A	135	135	142	154	154	191	191	191
	Weight (Kg)	10.7	13	16	28	48	94	162	272	455	482	1000	1074	1096
ISO PN 25, 40*	L	205	210	222	264	335	433	524	637	762	767	1024	1030	1136
	W	156	166	190	210	254	318	382	446	522	590	650	714	778
	h	78	83	95	105	127	159	191	223	261	295	325	357	389
	H	260	265	278	332	422	542	666	783	961	996	1179	1208	1241
	P	N/A	N/A	N/A	N/A	N/A	135	130	142	154	154	191	191	N/A
	Weight (Kg)	11.8	15	18.4	32	56	106	190	307	505	549	1070	1095	1129

Angle Pattern



	mm	40	50	65	80	100	150	200	250	300	350	400	450
ISO PN 10, 16	L	124	124	149	152	190	225	265	320	396	400	450	450
	W	156	166	190	200	229	285	344	408	496	528	598	640
	R	78	83	95	100	115	143	172	204	248	264	299	320
	h	85	85	109	102	127	152	203	219	273	279	369	370
	H	252	252	271	308	390	476	619	717	911	915	1144	1144
	P	N/A	N/A	N/A	N/A	N/A	141	141	156	156	156	195	195
	Weight (Kg)	10.7	13	16	26	46	90	153	259	433	459	950	1020
ISO PN 25, 40*	L	124	124	149	159	200	234	277	336	415	419	467	467
	W	150	155	190	200	254	318	381	446	522	586	650	716
	R	78	85	95	105	127	159	191	223	261	293	325	358
	h	85	85	109	109	135	165	216	236	294	299	386	386
	H	252	264	271	315	398	491	632	733	930	935	1160	1160
	P	N/A	N/A	N/A	N/A	N/A	141	136	156	156	156	195	195
	Weight (Kg)	11.8	15	18.4	30	54	101	179	292	481	523	1017	1051

SI 700 & 800 Metric

Control Chamber Displacement Volume (liter)

DN	40-65	80	100	150	200	250	300-350	400-500	600-800
700 Series	0.125	0.3	0.45	2.15	4.5	8.5	12.4	29.9	98.0
800 Series	0.04	0.12	0.3	1.1	2.3	4.0	8.0	18.7	-

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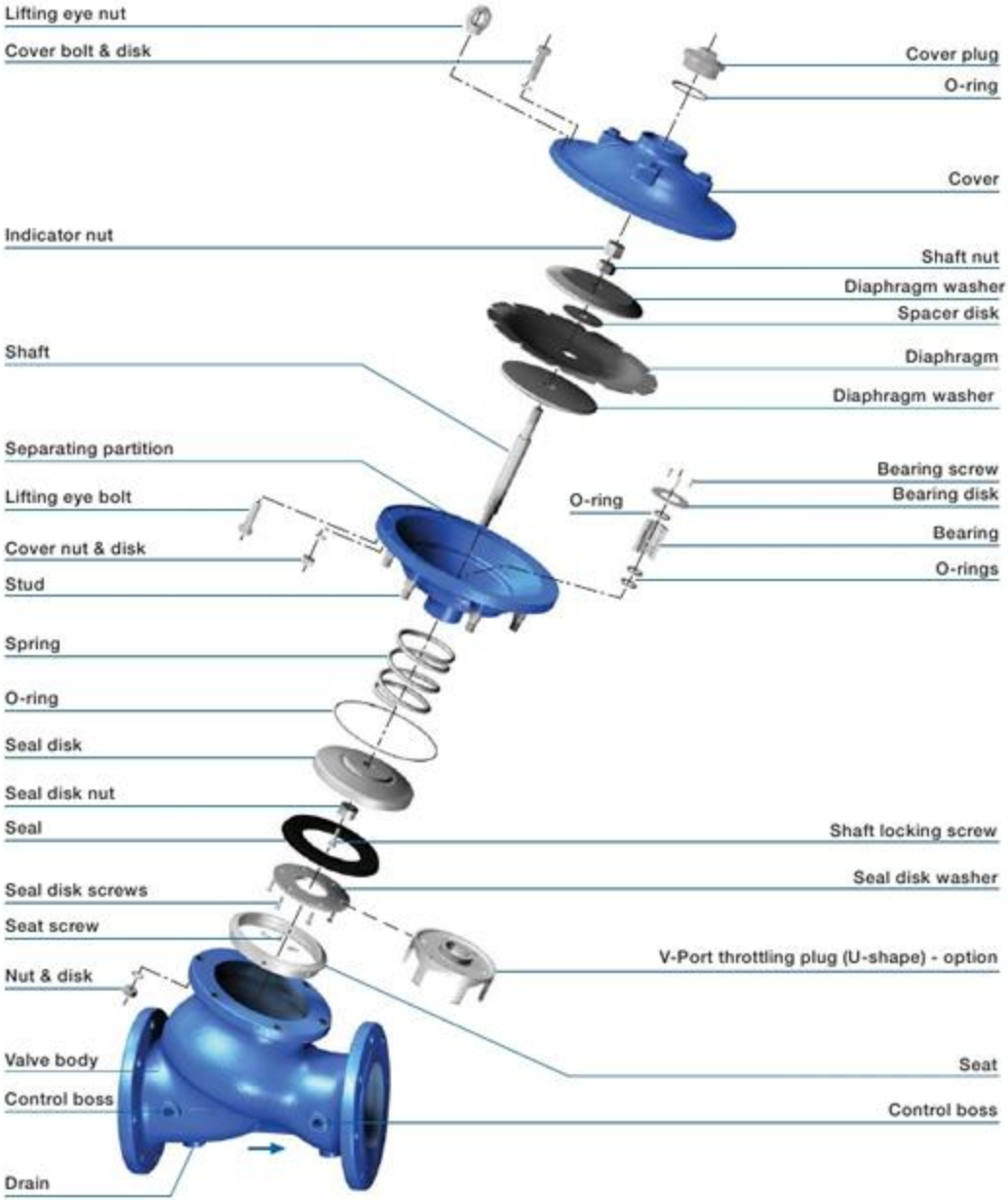
700 Valve - Exploded View

700 Series



For spare parts ordering, Please use BERMAD "Spare Parts Ordering Guide"

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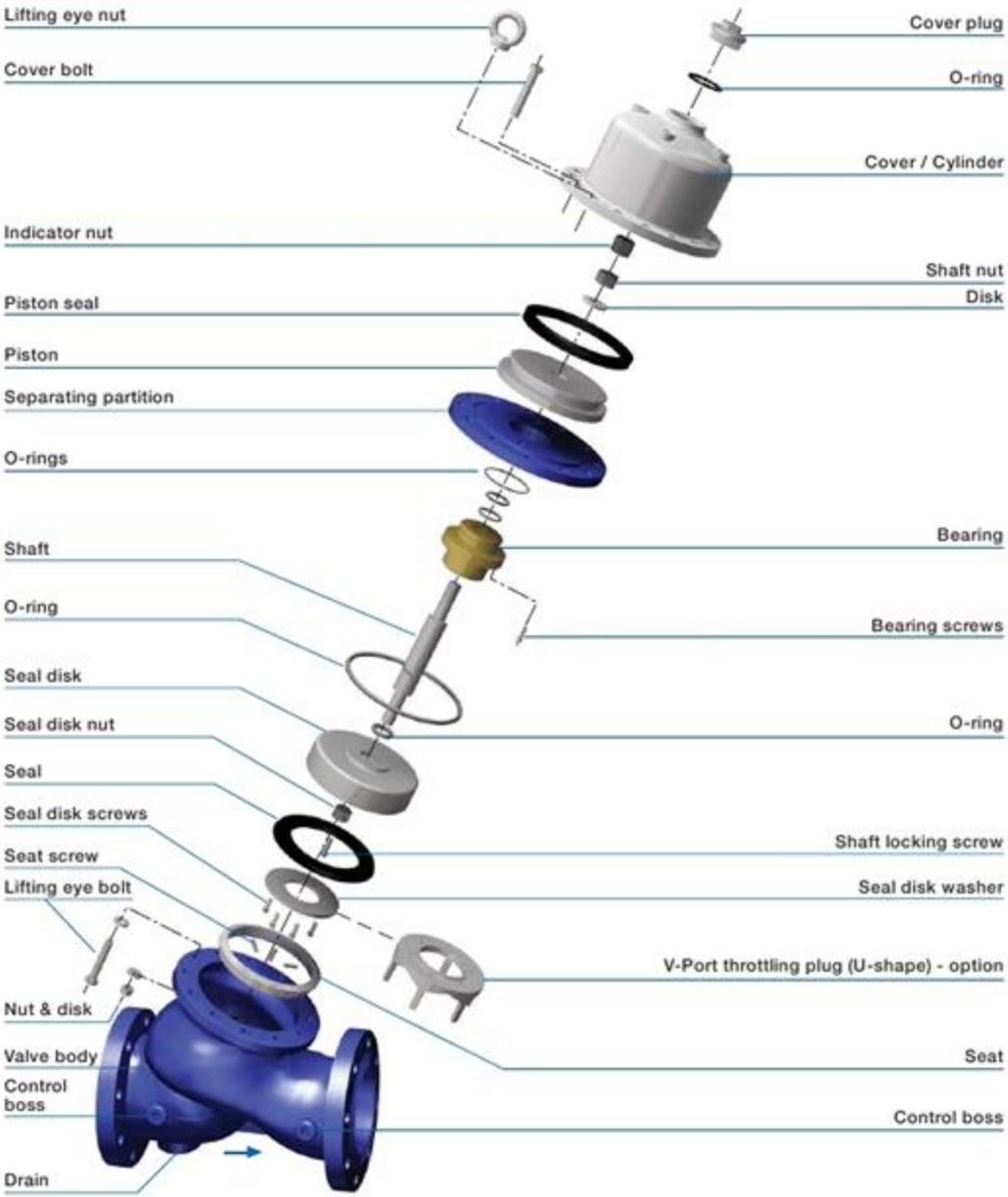
800 Valve - Exploded View

800 Series



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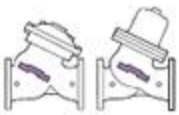
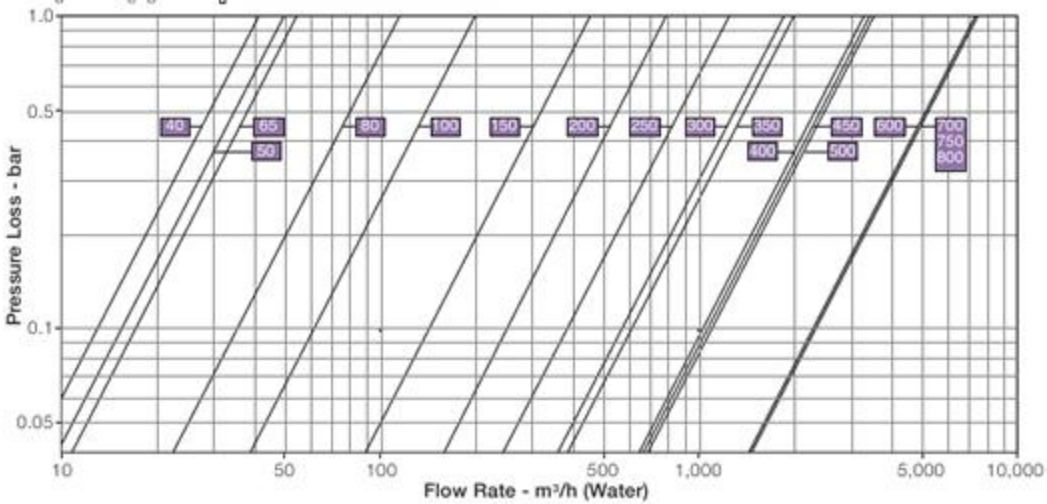
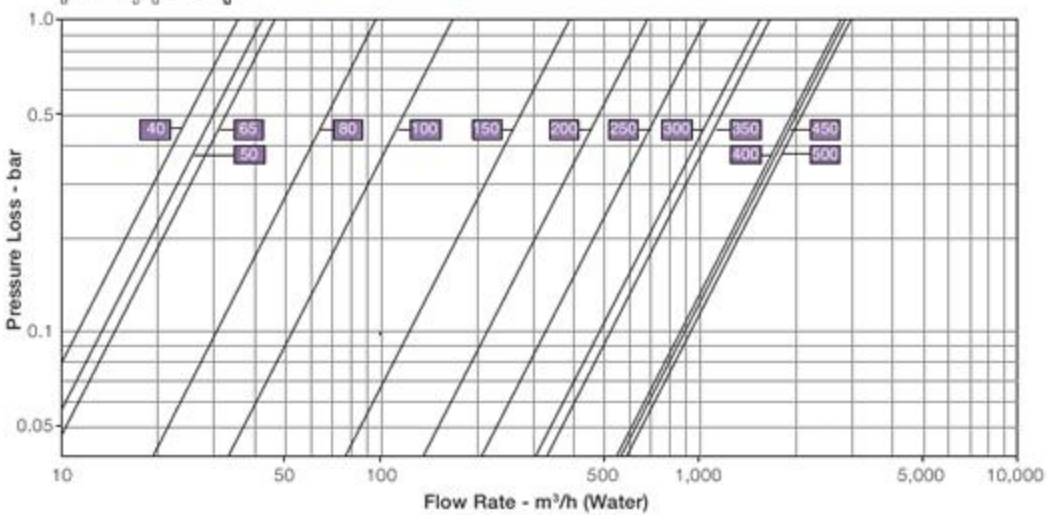
SI Metric



Y Pattern, Flat Disk



Y Pattern, Throttling Plug (U-Type)



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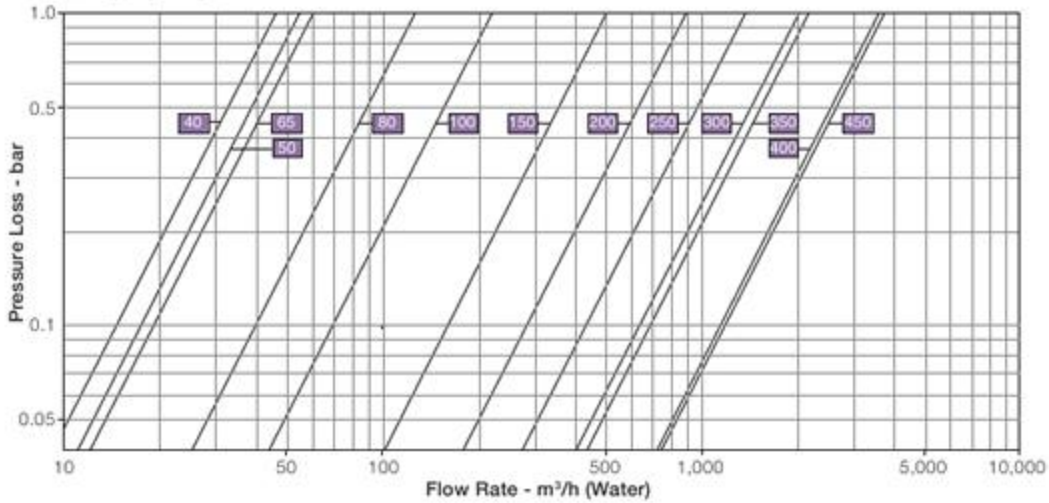
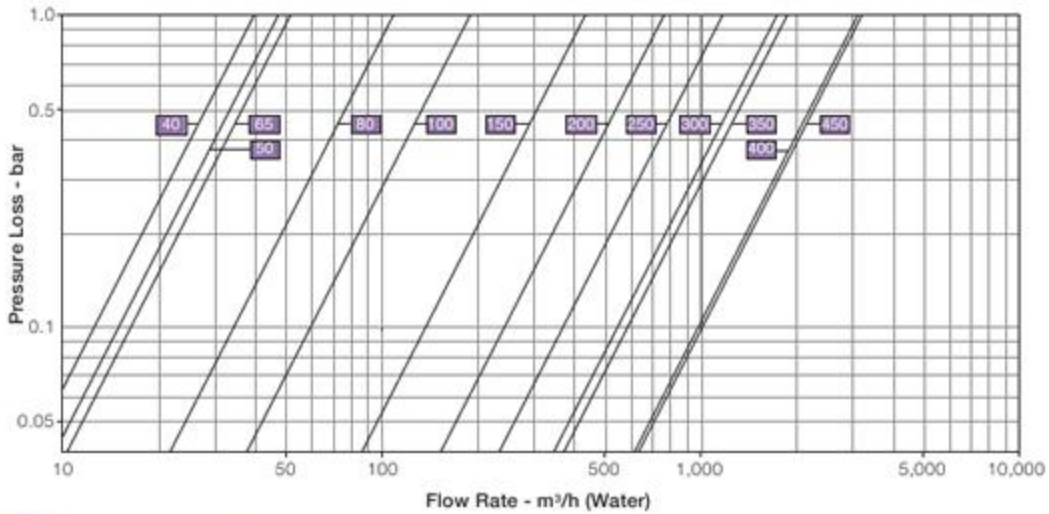
SI Metric

Angle Pattern, Flat Disk



Angle Pattern, Throttling Plug (U-Type)



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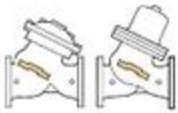
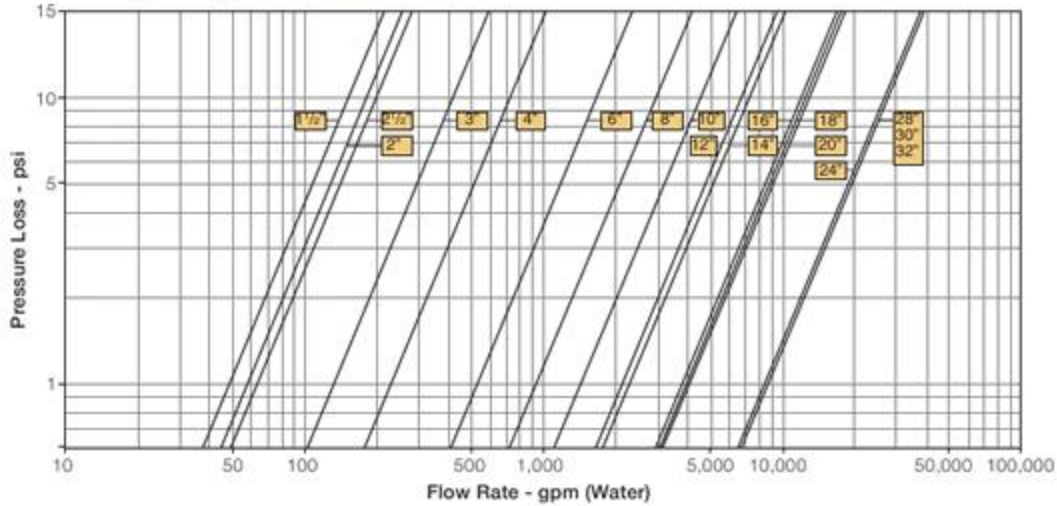
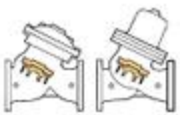
US English

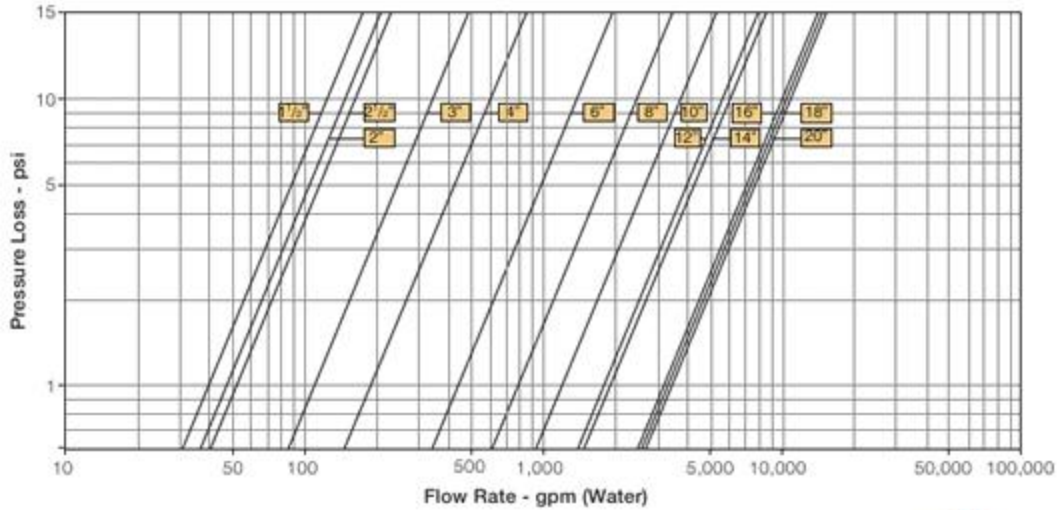


Y Pattern, Flat Disk





Y Pattern, Throttling Plug (U-Type)



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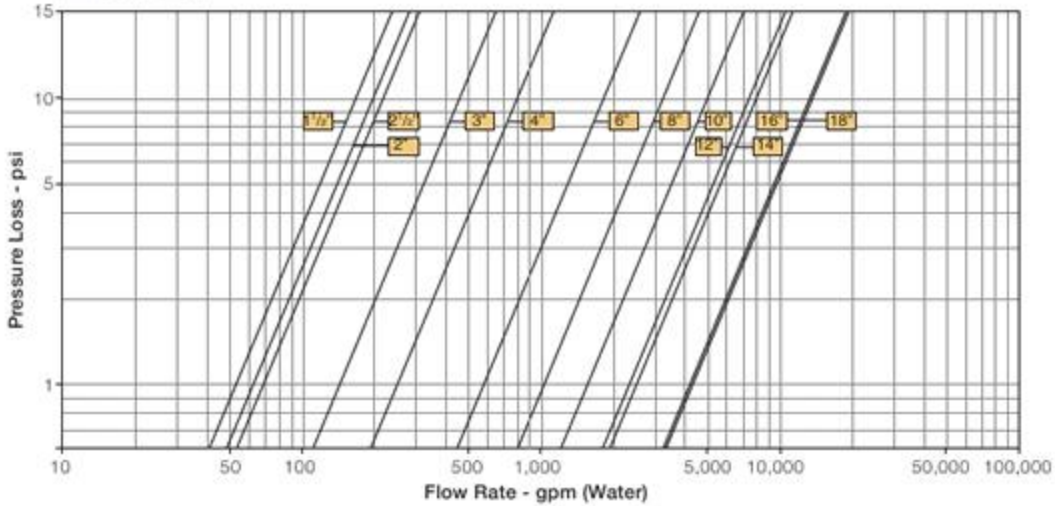
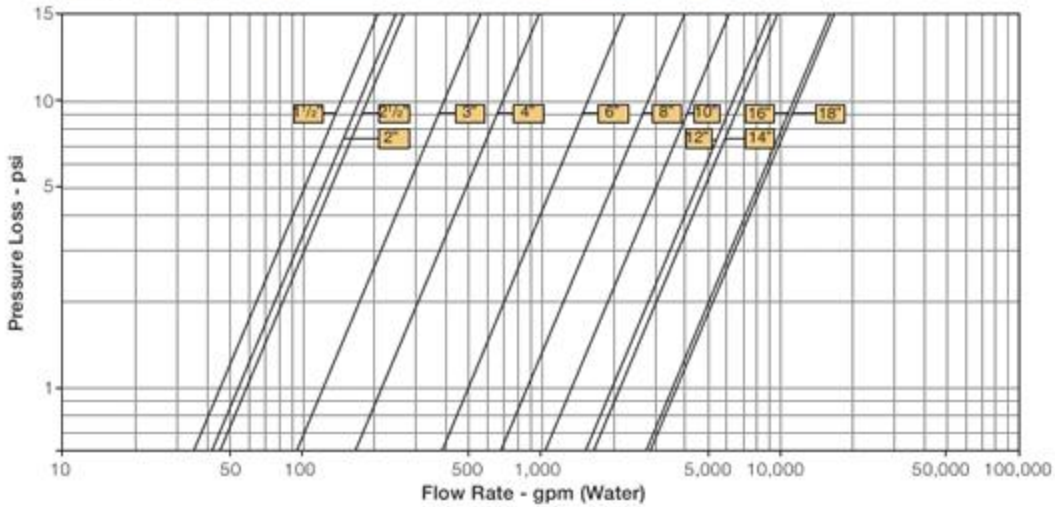
US English

Angle Pattern, Flat Disk



Angle Pattern, Throttling Plug (U-Type)



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SI Metric

	mm	40	50	65	80	100	150	200	250	300	350	400	450	500
Y-Pattern Flat Disk 	Kv	42	50	55	115	200	460	815	1,250	1,850	1,990	3,310	3,430	3,550
	K	2.3	3.9	9.2	4.9	3.9	3.7	3.8	3.9	3.7	5.9	3.7	5.5	7.8
	Leq - m	4.3	10.3	33.4	21.6	23.0	37.5	53.9	70.0	85.6	159.9	112.7	204.8	323.8
Y-Pattern U-Plug 	Kv	36	43	47	98	170	391	693	1,063	1,573	1,692	2,814	2,916	3,018
	K	3.1	5.4	12.8	6.7	5.4	5.2	5.2	5.4	5.1	8.2	5.1	7.6	10.8
	Leq - m	6.0	14.3	46.2	29.9	31.9	51.9	74.6	96.8	118.4	221.3	155.9	283.5	448.1
Angle Pattern Flat Disk 	Kv	46	55	61	127	220	506	897	1,375	2,035	2,189	3,641	3,773	NA
	K	1.9	3.2	7.6	4.0	3.2	3.1	3.1	3.2	3.1	4.9	3.0	4.5	NA
	Leq - m	3.6	8.5	27.6	17.8	19.0	31.0	44.6	57.8	70.7	132.1	93.1	169.3	NA
Angle Pattern U-Plug 	Kv	39	47	51	108	187	430	762	1,169	1,730	1,861	3,095	3,207	NA
	K	2.6	4.5	10.6	5.6	4.5	4.3	4.3	4.5	4.2	6.8	4.2	6.2	NA
	Leq - m	5.0	11.8	38.2	24.7	26.4	42.9	61.7	80.0	97.9	182.9	128.9	234.3	NA

SI Metric

	mm	600	700	750	800
G-Pattern Flat Disk 	Kv	7,350	7,500	7,500	7,500
	K	3.8	6.7	8.8	11.4
	Leq - m	188.0	390.1	550.9	760.7

Valve flow coefficient, Kv or Cv $Kv(Cv)=Q\sqrt{\frac{G_f}{\Delta P}}$

Where:
Kv = Valve flow coefficient (flow in m^3/h at 1bar Diff. Press.)
Cv = Valve flow coefficient (flow in gpm at Diff. Press. 1psi)
Q = Flow rate (m^3/h ; gpm)
ΔP = Differential pressure (bar ; psi)
Gf = Liquid specific gravity (Water = 1.0)

Cv = 1.155 Kv

Flow resistance or Head loss coefficient, $K = \Delta H \frac{2g}{V^2}$

Where:
K = Flow resistance or Head loss coefficient (dimensionless)
ΔH = Head loss (m ; feet)
V = Nominal size flow velocity (m/sec ; feet/sec.)
g = Acceleration of gravity (9.81 m/sec^2 ; 32.18 $feet/sec^2$)

Equivalent Pipe Length, Leq **Leq = Lk·D**

Where:
Leq = Equivalent nominal pipe length (m ; feet)
Lk = Equivalent length coefficient for turbulent flow in clean commercial steel pipe (SCH 40)
D = Nominal pipe diameter (m ; feet)

Note:
The Leq values given are for general consideration only.
Actual Leq may vary somewhat with each of the valve sizes.

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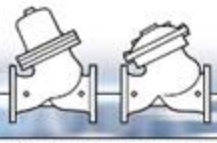

US English

	inch	1.5"	2"	2.5"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"
Y-Pattern Flat Disk	Cv	49	58	64	133	230	530	940	1,440	2,140	2,300	3,820	3,960	4,100
	K	2.3	3.9	9.2	4.9	3.9	3.7	3.8	3.9	3.7	5.9	3.7	5.5	7.8
	Leq-feet	14.2	33.8	109.5	70.8	75.6	123.0	176.9	229.5	280.8	524.5	369.6	671.9	1,062.3
Y-Pattern U-Plug	Cv	41	49	54	113	200	450	800	1,230	1,820	1,950	3,250	3,370	3,490
	K	3.1	5.4	12.8	6.7	5.4	5.2	5.2	5.4	5.1	8.2	5.1	7.6	10.8
	Leq-feet	19.7	46.8	151.6	97.9	104.6	170.2	244.8	317.6	388.6	725.9	511.6	930.0	1,470.3
Angle Pattern Flat Disk	Cv	53	64	70	146	250	580	1,040	1,590	2,350	2,530	4,210	4,360	NA
	K	1.9	3.2	7.6	4.0	3.2	3.1	3.1	3.2	3.1	4.9	3.0	4.5	NA
	Leq-feet	11.7	28.0	90.5	58.5	62.5	101.6	146.2	189.7	232.0	433.4	305.5	555.3	NA
Angle Pattern U-Plug	Cv	45	54	59	124	220	500	880	1,350	2,000	2,150	3,580	3,710	NA
	K	2.6	4.5	10.6	5.6	4.5	4.3	4.3	4.5	4.2	6.8	4.2	6.2	NA
	Leq-feet	16.3	38.7	125.3	80.9	86.5	140.7	202.4	262.5	321.2	599.9	422.8	768.6	NA

US English

	inch	24"	28"	30"	32"
G-Pattern Flat Disk	Cv	8,490	8,670	8,670	8,670
	K	3.8	6.7	8.8	11.4
	Leq-feet	616.6	1,280.0	1,807.3	2,495.6

Valve flow coefficient, Kv or Cv $Kv(Cv)=Q\sqrt{\frac{G_f}{\Delta P}}$

Where:
Kv = Valve flow coefficient (flow in m^3/h at 1bar Diff. Press.)
Cv = Valve flow coefficient (flow in gpm at Diff. Press. 1psi)
Q = Flow rate (m^3/h ; gpm)
ΔP = Differential pressure (bar ; psi)
Gf = Liquid specific gravity (Water = 1.0)

Cv = 1.155 Kv

Flow resistance or Head loss coefficient, $K = \Delta H \frac{2g}{V^2}$

Where:
K = Flow resistance or Head loss coefficient (dimensionless)
ΔH = Head loss (m ; feet)
V = Nominal size flow velocity (m/sec ; feet/sec.)
g = Acceleration of gravity (9.81 m/sec^2 ; 32.18 $feet/sec^2$)

Equivalent Pipe Length, Leq **Leq = Lk·D**

Where:
Leq = Equivalent nominal pipe length (m ; feet)
Lk = Equivalent length coefficient for turbulent flow in clean commercial steel pipe (SCH 40)
D = Nominal pipe diameter (m ; feet)

Note:
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Actual Leq may vary somewhat with each of the valve sizes.

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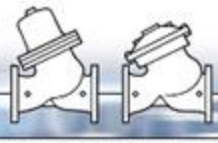

Standard Operation Pressure – Materials Data

End Connections Standards / Pressure Ratings / Materials / Max. Operating Pressure

Bermad Code	End Connections Standard	Pressure Class	Ductile iron to ASTM A-536 or EN 1563	Carbon steel to ASTM A-216-WCB or EN 10083-1	Stainless steel 316 to ASTM A-743 CF8M or EN 10088-1	Nickel aluminum bronze to ASTM B-148 C 95800 or BS-EN 1400 AB-2
10 or E1	ISO	PN 10	+	+	+	+
16 or E6	ISO	PN 16	+	+	+	16 bar
25 or E5	ISO	PN 25	25 bar	25 bar	25 bar	25 bar
40	ISO	PN 40 *	–	40 bar	40 bar	–
A5	ANSI	# 150	250 psi	285 psi	285 psi	250 psi
A3	ANSI	# 300	400 psi	400 psi	400 psi	400 psi
A4	ANSI	# 400 *	–	600 psi	600 psi	–
BD	BS 10	Table D	+	+	+	+
BH	BS 10	Table H	400 psi	400 psi	400 psi	400 psi
J1	JIS	10 K	+	+	+	+
J6	JIS	16 K	27 bar	27 bar	27 bar	27 bar
J2	JIS	20 K	28 bar	28 bar	28 bar	28 bar
J3	JIS	30 K *	–	40 bar	40 bar	–
B1	ABNT	10	+	+	+	+
B6	ABNT	16	+	+	+	16 bar
B2	ABNT	25	25 bar	25 bar	25 bar	25 bar
	Threads					
BP	BSP (Rp ISO 7/1)					
PH	BSP (Rp ISO 7/1)		25 bar	25 bar	25 bar	25 bar
NP	NPT					
NH	NPT		400 psi	400 psi	400 psi	400 psi

* External flange diameter might vary then the standard.
Can be used in 800 series only.

+ Available, Not required by the standard pressure class
– Not available

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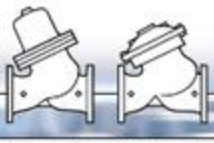

SI 700 Metric

Available Sizes & Patterns
- DN 40 - DN 500 - Y Pattern
- DN 40 - DN 450 - Angle
- DN 600 - DN 800 - Globe

Connection Standard
- Flanged: ISO 7005-2 (ISO 10, 16 & 25)
- Threaded: BSP (Rp ISO 7/1) or NPT (DN 40 - DN 80)

Water Temperature
- Up to 80°C

Working pressure
- ISO PN 16: 16 bar
- ISO PN 25: 25 bar

Standard Materials
- **Main valve body and cover**
  Ductile Iron to EN 1563
- **Main valve internals**
  Stainless Steel, Bronze & Epoxy coated Steel
- **Control Trim**
  Brass, Bronze accessories
  Stainless Steel 316 fittings & tubing
  or forged Brass fittings & Copper tubing
- **Elastomers**
  NBR
- **Coating**
  Blue fusion bonded Epoxy

Optional Materials
- **Main valve body and cover**
  Carbon Steel to EN 10083-1
  Stainless Steel 316 to EN 10088-1
  Nickel Aluminum Bronze to BS-EN 1400 AB-2
  Other materials on request
- **Control Trim**
  Stainless Steel 316, Nickel Aluminum Bronze,
  Hastalloy C-276 accessories
  Monel fittings & tubing
- **Elastomers**
  EPDM
  FPM

SI 800 Metric

Available Sizes & Patterns
- DN 40 - DN 500 - Y Pattern
- DN 40 - DN 450 - Angle

Connection Standard
- Flanged: ISO 7005-1(ISO 10, 16, 25 & 40)

Water Temperature
- Up to 80°C

Working pressure
- ISO PN 16: 16 bar
- ISO PN 25: 25 bar
- ISO PN 40: 40 bar

Standard Materials
- **Main valve body**
  Carbon Steel to EN 10083-1
- **Valve cover (piston cylinder)**
  Stainless Steel or Bronze
- **Main valve internals**
  Stainless Steel and Bronze
- **Control Trim**
  Brass, Bronze accessories
  Stainless Steel 316 fittings & tubing
  or forged Brass fittings & copper tubing
- **Elastomers**
  NBR
- **Coating**
  Blue fusion bonded Epoxy

Optional Materials
- **Main valve body and Cover**
  Ductile Iron to EN 1563
  Stainless Steel 316 to EN 10088-1
  Nickel Aluminum Bronze to BS-EN 1400 AB-2
  Other materials on request
- **Control Trim**
  Stainless Steel 316, Nickel Aluminum Bronze,
  Hastalloy C-276 accessories
  Monel fittings & tubing
- **Elastomers**
  EPDM
  FPM

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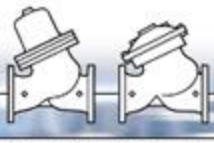

US 700 English

Available Sizes & Patterns
- 1½" - 20" - Y Pattern
- 1½" - 18" - Angle
- 24" - 32" - Globe

Connection Standard
- Flanged: ANSI B16.42 (Ductile Iron)
- Threaded: NPT or BSP (1½" -3")

Water Temperature
- Up to 180ºF

Working pressure
- Class #150: 250 psi
- Class #300: 400 psi

Standard Materials
- **Main valve body and cover**
  Ductile Iron to ASTM A-536
- **Main valve internals**
  Stainless Steel, Bronze & Epoxy coated Steel
- **Control Trim**
  Brass, Bronze accessories
  Stainless Steel 316 fittings & tubing
  or forged Brass fittings & Copper tubing
- **Elastomers**
  NBR
- **Coating**
  Blue fusion bonded Epoxy

Optional Materials
- **Main valve body and cover**
  Carbon Steel to ASTM A-216-WCB
  Stainless Steel 316 to ASTM A-743 CF8M
  Nickel Aluminum Bronze to ASTM B-148 C 95800
  Other materials on request
- **Control Trim**
  Stainless Steel 316, Nickel Aluminum Bronze,
  Hastalloy C-276 accessories
  Monel fittings & tubing
- **Elastomers**
  EPDM
  FPM

US 800 English

Available Sizes & Patterns
- 1½" - 20" - Y Pattern
- 1½" - 18" - Angle

Connection Standard
- Flanged: ANSI B16.5 (Cast steel)

Water Temperature
- Up to 180ºF

Working pressure
- Class #150: 250 psi
- Class #300: 400 psi
- Class #400: 600 psi

Standard Materials
- **Main valve body**
  Carbon Steel to ASTM A-216-WCB
- **Valve cover (piston cylinder)**
  Stainless Steel or Bronze
- **Main valve internals**
  Stainless Steel and Bronze
- **Control Trim**
  Brass, Bronze accessories
  Stainless Steel 316 fittings & tubing
  or forged Brass fittings & Copper tubing
- **Elastomers**
  NBR
- **Coating**
  Blue fusion bonded Epoxy

Optional Materials
- **Main valve body and Cover**
  Ductile Iron to ASTM A-536
  Stainless Steel 316 to ASTM A-743 CF8M
  Nickel Aluminum Bronze to ASTM B-148 C 95800
  Other materials on request
- **Control Trim**
  Stainless Steel 316, Nickel Aluminum Bronze,
  Hastalloy C-276 accessories
  Monel fittings & tubing
- **Elastomers**
  EPDM
  FPM

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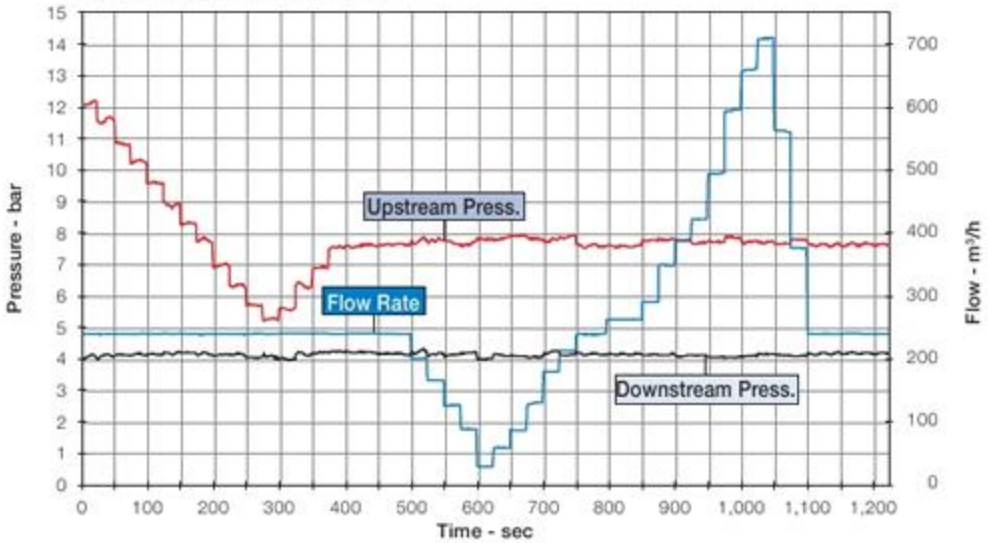
Typical Pressure Reducing Performance Chart

Actual Hydraulic Laboratory Results



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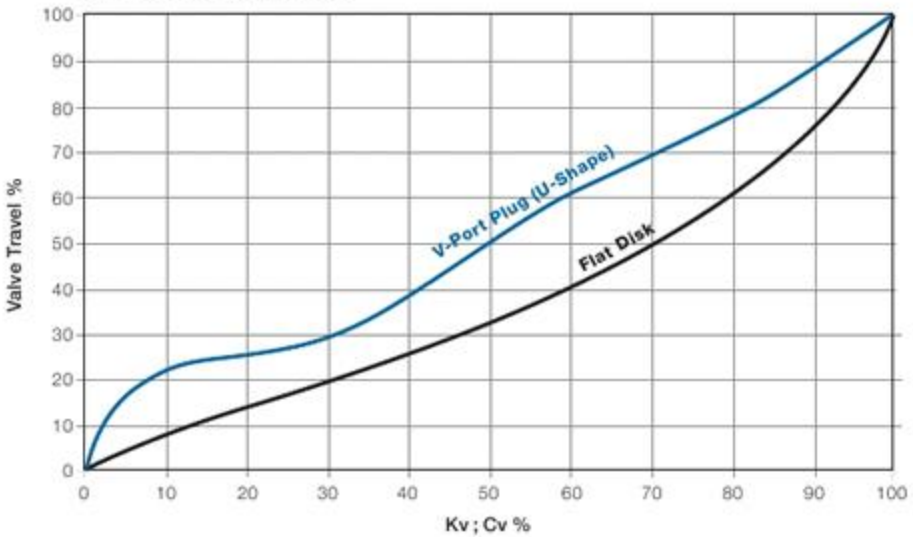
Valve Plugs Characteristics

Kv ; Cv to Valve Opening Chart



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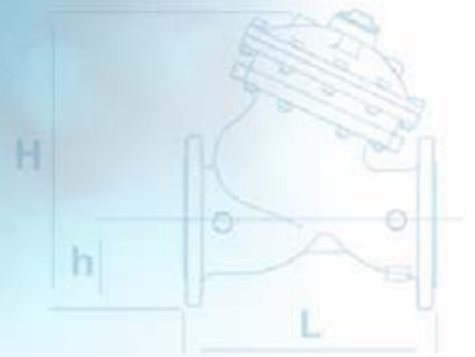
Engineering Data

- Technical Specifications SI
- Dimensions & Weights 700EN SI
- Dimensions & Weights 700 SI
- Dimensions & Weights 800 SI
- Flow Chart SI
- Flow Properties SI
- Cavitaion SI

- Technical Specifications US
- Dimensions & Weights 700 US
- Dimensions & Weights 800 US
- Flow Chart US
- Flow Properties US
- Cavitaion US

- Exploded View - 700 Series
- Exploded View - 800 Series
- Pressure Rating
- Valve Plugs Characteristics
- Typical Pressure Reducing Performance Chart



Flow Control Valves

To ensure that meters, filters, pumps and other distribution equipment do not experience flows that exceed their operating capacity, many distribution systems employ modulating Flow Control Valves that maintain a preset maximum flow rate regardless of variations in demand or upstream / downstream pressure.

- **770-U – Flow Control Valve**
- **770-55-U – Flow Control Valve with Solenoid Control**
- **772-U – Flow Control and Pressure Reducing Valve**
- **Orifice Plate Assembly**
- **Pitot Tube**

BERMAD Waterworks

Hydraulic Control Valves

- **Pressure Reducing Valves**
- **Pressure Relief / Sustaining Valves**
- **Flow Control Valves**
- **Level Control Valves**
- **Pump Control Valves**
- **Check Valves**
- **Surge Anticipating Valves**
- **Solenoid Controlled Valves**
- **Electronic Control Valves**
- **Burst Control Valves**
- **Pilots**
- **Accessories**
- **Engineering Data**

- The Best of the Biggest, 24-32" Control Valves
- 700 & 800 Series Basic Valve
- Bermad Company Profile
- BERMAD in Waterworks and Industrial Applications
- Bermad International Standards, Approvals and Certifications

Level Control Valves

Level Control Valves combine the advantages of hydraulic control valves with the simplicity of either an altitude pilot or mechanical floats. External installation of the main valve eliminates the installation and maintenance problems associated with mechanical float valves installed in the reservoir.

A wide selection of altitude and float pilot types makes Bermad Float Control Valves the right solution wherever level control is required.

- **750-80-X – Altitude Control Valve**
- **750-66-B – Level Control Valve with Bi-Level Vertical Float**
- **750-65 – Level Control Valve with Bi-Level Electric Float**
- **750-67 – Level Control Valve with Modulating Vertical Float**
- **750-60 – Level Control Valve with Modulating Horizontal Float**
- **753-66 – Level Control and Pressure Sustaining Valve with Bi-Level Vertical Float**
- **753-65 – Level Control and Pressure Sustaining Valve with Bi-Level Electric Float**
- **757-66-U – Level and Flow Control Valve with Bi-Level Vertical Float**
- **66 – Bi-Level Vertical Float**
- **67 – Modulating Vertical Float**

Pilots

- #2PB – Pressure Reducing Pilot
- #2 – Pressure Reducing Pilot
- #2HC – Pressure Reducing Pilot
- #3PB – Pressure Sustaining Pilot
- #3 – Pressure Sustaining Pilot
- #3HC – Pressure Sustaining Pilot
- #8 – Altitude Positioning Pilot
- #82 – High Sensitivity Pressure Reducing Pilot
- #83 – High Sensitivity Pressure Sustaining Pilot
- #X – Positioning Pilot
- PC-3Q – Quick Pressure Relief Pilot

Pressure Reducing Valves

Maintaining hydraulic balance in water transmission and distribution systems is crucial to system efficiency. Pressure Reducing Valves help accomplish this by reducing high inlet pressure to a lower constant predetermined delivery pressure. They are the most commonly used control valves.

- **720 – Pressure Reducing Valve**
- **820 – High Pressure, Pressure Reducing Valve**
- **723 – Pressure Sustaining and Reducing Valve**
- **720-55 – Pressure Reducing Valve with Solenoid Control**
- **720-20 – Pressure Reducing Valve with Check Feature**
- **720-PD – Proportional Pressure Reducing Valve**
- **820-PP – High Pressure Proportional Pressure Reducing Valve**

Relief/Sustaining Valves

Pressure Relief/Sustaining Valves protect pumps and water distribution systems from two extreme situations:

- When installed off-line, they relieve damaging excessive pressure.
- When installed in-line, they sustain minimum back pressure thus prioritizing pressure zones and preventing line emptying, pump overload, etc.

- **730 – Pressure Relief/Sustaining Valve**
- **730-55 – Pressure Relief/Sustaining Valve with Solenoid Control**
- **736 – Differential Pressure Sustaining Valve**
- **73Q – Quick Pressure Relief Valve**

Pump Control Valves

Pump Control Valves protect pumps, pipelines, and other system components by isolating the pipeline from the sudden velocity changes associated with pump starting and stopping. The "Active Check Valve" operating logic employs a method of pumping system control that prevents surges rather than trying to minimize them.

- **740 – Booster Pump Control Valve, Active Check Valve**
- **740Q – Booster Pump Control Valve, Quick Active Check Valve**
- **840 – High Pressure Booster Pump Control Valve, Active Check Valve**
- **743 – Booster Pump Control & Pressure Sustaining Valve**
- **748 – Pump Circulation and Pressure Sustaining Control Valve, Pump Check Valve Enhancer**

Solenoid Controlled Valves

Solenoid Controlled Valves are simple electrically activated on/off valves that can be of critical importance in controlling flow in every water system. The electric signal used to activate the solenoid can be sent from timers, relays, clocks or pressure, level or flow transmitters, etc.

- **710 – Solenoid Controlled Valve**
- **710-20 – Solenoid Controlled Valve with Check Feature**
- **710-B – Powered Opening Solenoid Controlled Valve**

Surge Anticipating Valves

Abrupt pump stopping is followed by a pressure drop as the water column continues traveling along the line. The returning column hits the closed pump check valve, creating a high pressure surge wave, which travels at up to 4 Mach.
Eliminating such surge requires anticipation and pre-action. Surge Anticipating Valves react to the pressure drop, accepting the returning column while already open, thus eliminating the surge.

- **735-M – Surge Anticipating Control Valve**
- **835-M – High Pressure Surge Anticipating Control Valve**
- **735-55-M – Surge Anticipating Control Valve with Solenoid Control**

Check Valve

Lift Type

- Pump check valve
- One-way zone isolation
- Return flow prevention

The Model 70N Check Valve is a non-slam, lift type, non return valve that opens to allow flow in the required direction and smoothly closes drip tight to prevent back flow.

Features and Benefits

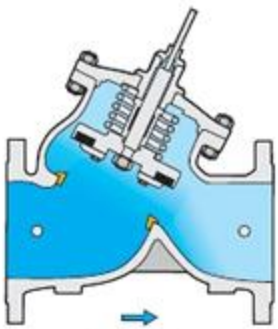
- **Non-slam closing** – Eliminates system surges
- **In-line serviceable** – Easy maintenance
- **Flexible design** – Convertible to hydraulic valve
- **"Y" or angle, wide body** – Minimized pressure loss
- **Semi-straight flow** – Non-turbulent flow
- **Stainless Steel raised seat** – Cavitation damage resistant
- **Obstacle free, full bore** – Uncompromising reliability

Major Additional Features

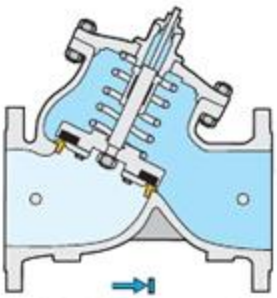
- Valve position indicator – **70N-I**
- Electric limit switch – **70N-S**
- Double check valve – **72N**

Operation

The Model 70N is built on a standard 700 Series body assembly and reacts to differential pressure across its seal disk. It opens and closes in a non-slam manner according to the flow.
A spring provides additional closing force.



Normal flow



Back flow prevented

Engineer Specifications

The Check Valve shall open to allow flow in the required direction and close drip-tight with no slam to prevent back flow.

Main Valve: The main valve shall be a globe valve of either oblique (Y) or angle pattern design. The body shall have a replaceable, raised, stainless steel seat ring. 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.

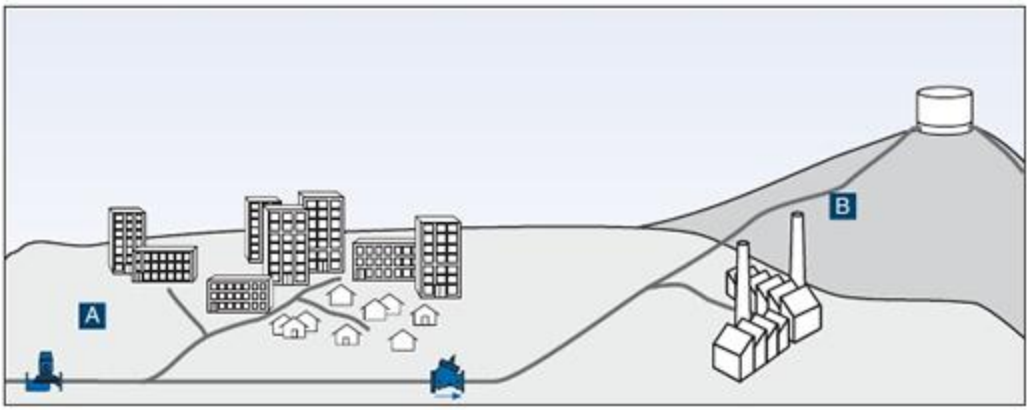
Actuator: The entire internal assembly (seal disk to cover) shall be removable from the valve. The stainless steel valve shaft shall be center guided by a bearing in the cover and shall accept a valve position indicator with limit switch. The replaceable radial seal disk shall include a resilient seal.

Quality Assurance: The assembled valve shall be hydraulically tested. 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

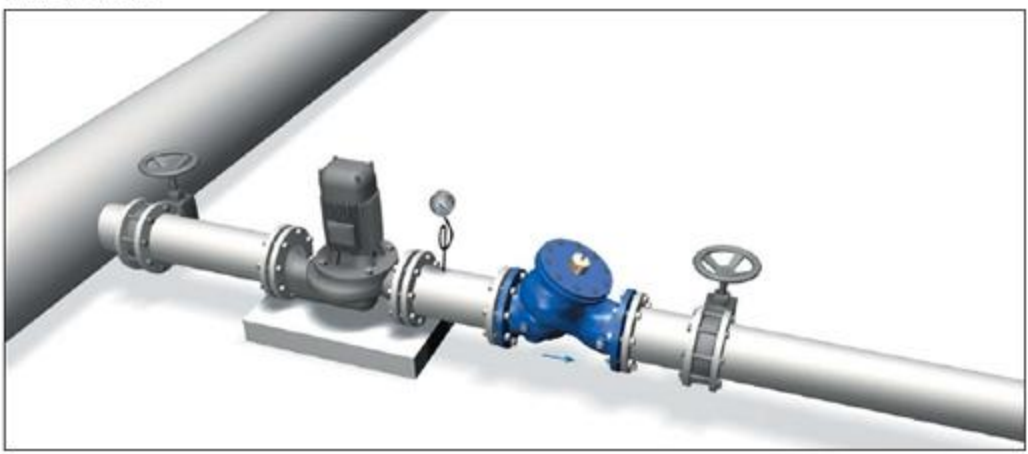
One-Way Zone Isolation

In complex distribution networks, multiple zones are supplied from multiple sources. Each zone has its own characteristic demands and each source has its characteristic capacity. Often each source is designated to serve a specific zone, with a backup supply designed into the system.



In this system, source **A** supplies zone **A** and backs up the farther zone. Source **B** supplies zone **B**, but does not have enough capacity to backup any other zone.
The Model 70N Check Valve, installed between the zones, allows flow from source **A** to zone **B**, but not from source **B** to zone **A**.

Pump Check Valve



700 Series

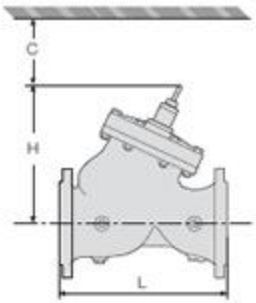
Model 70N

Technical Data

Dimensions and Weights

Size		L		L1		H		W		W1		C	
mm	inch	mm	inch	mm	inch	mm	inch	kg	lbs	kg	lbs	mm	inch
40	1½"	205	8.1	205	8.1	125	4.9	7.0	15.4	9.0	19.8	180	7
50	2"	210	8.3	210	8.3	125	4.9	8.0	17.6	10	22	180	7
65	2½"	222	8.7	222	8.7	125	4.9	11	24.3	14	30.9	180	7
80	3"	250	9.8	264	10.4	170	6.7	18	39.7	21	46.3	230	9
100	4"	320	12.6	335	13.2	210	8.3	30	66.1	36	79.4	275	11
150	6"	415	16.3	433	17.0	270	10.6	52	115	62	137	385	15
200	8"	500	19.7	524	20.6	330	13.0	85	187	106	234	460	18
250	10"	605	23.8	637	25.1	420	16.5	147	324	173	386	580	23
300	12"	725	28.5	762	30.0	480	18.9	254	560	295	650	685	27
350	14"	733	28.9	767	30.2	480	18.9	265	584	318	701	685	27
400	16"	990	39.0	1024	40.3	620	24.4	573	1268	630	1389	965	38
450	18"	1000	39.4	1030	40.5	620	24.4	690	1521	775	1708	965	38
500	20"	1100	43.3	1138	44.7	620	24.4	800	1764	890	1962	965	38

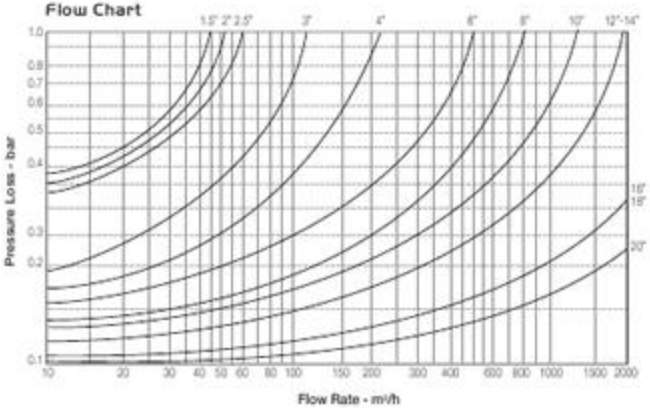
L,W – ISO 10 & 16, ANSI 150
L1,W1 – ISO 25, ANSI 300
"L", ISO standard lengths available
"C" enables removing the actuator in one unit



Specifications

Patterns: "Y" (globe) & angle
Size Range: 1½ - 20" (40-500 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: Ductile Iron
Cover: Steel
Internals:
Stainless Steel, Bronze,
coated Steel & Delerine
Seals: NBR
Coating:
Fusion Bonded Epoxy, RAL 5005 (Blue)
NSF & WRAS approved or Electrostatic
Polyester Powder, RAL 6017 (Green)

Flow Chart



How to Order

Sector	Size	Primary Feature	Pattern	Body Material	End Connections	Coating	Additonal Attributes
WW	6"	70N	Y	C	16	EB	I
Waterworks	1½" - 20"	Check valve	Oblique (up to 20") Y Angle (up to 18") A	Ductile Iron Standard C Cast Steel S St. Steel 316 N	ISO-16 16 ISO-25 25 ANSI-150 A5 ANSI-300 A3 JIS-16 J6 JIS-20 J2	Epoxy FB Blue EB Polyester Green PG Polyester Blue PB Uncoated UC	Valve Position Indicator I Electric Limit Switch S

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Quick Pressure Relief Valve

- Immediately eliminates pressure peaks
- Visual indication of system over pressure
- Filtration system burst protection
- Thermal expansion over-pressure relief
- System maintenance savings

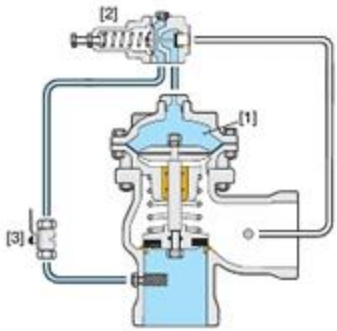
The Model 73Q Quick Pressure Relief Valve is a hydraulically operated, diaphragm actuated control valve that relieves excessive system pressure when this pressure rises above the pre-set value. It immediately, accurately, and with high repeatability responds to system pressure rise by fully opening.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

Features and Benefits

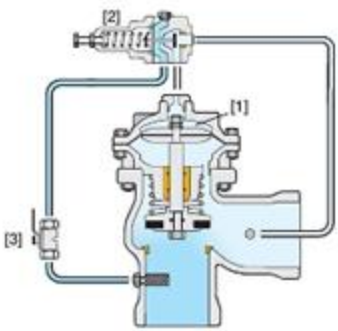
- **Hydraulic actuation**
  - Independent operation
  - Long term drip-tight sealing
  - Long term setting stability
  - Wide setting range
  - Tight setting window
  - Minimal hysteresis
- **Double chamber design**
  - Moderated valve closing (no surges)
  - Protected diaphragm
- **Obstacle free, full 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, and pressure in the upper control chamber is vented, causing the main valve to immediately open, thereby 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. For sizes 16" and larger, consult BERMAD.



Valve Closed
(system pressure is below setting)



Valve Open

Engineer 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.

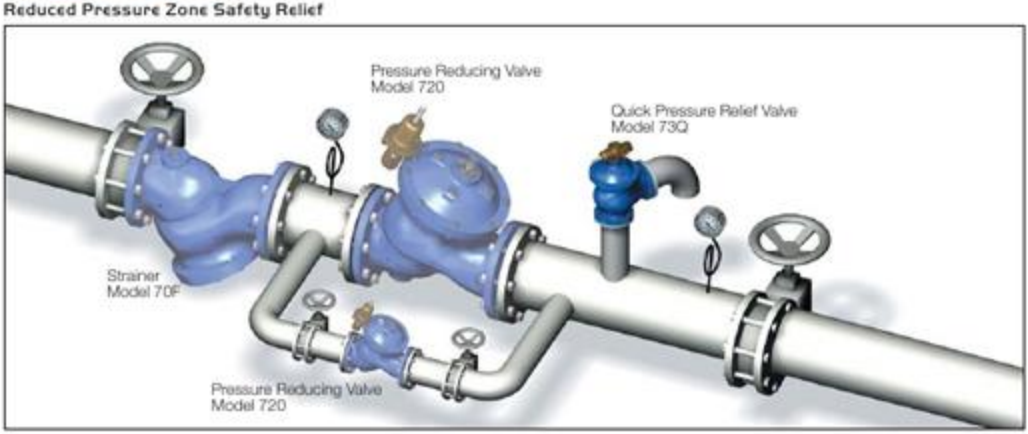
Actuator: The actuator assembly shall be double chambered with an inherent separating partition between the lower surface of the diaphragm and the main valve. The entire actuator assembly (seal disk to top cover) shall be removable from the valve as an integral unit. The stainless steel valve shaft shall 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 main 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



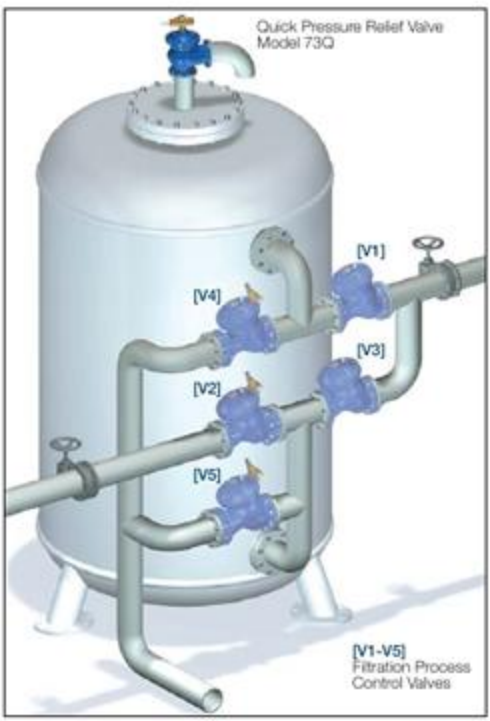
The Model 73Q Quick Pressure Relief Valve protects against:

- 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



BERMAD Waterworks

700 Series

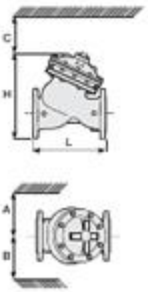
Model 73Q

Technical Data

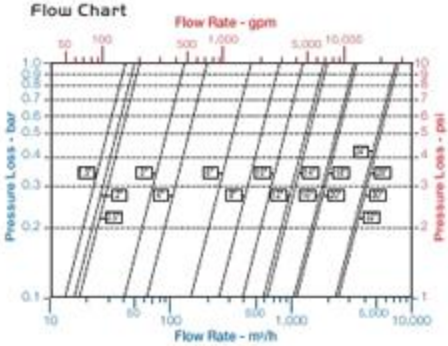
Dimensions and Weights

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	10.8	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	840	1863
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 disk valves
For more flow charts, refer to Engineering Section

Main Valve

Valve Patterns: "Y" (globe) & angle
Size Range: 1"/₂-32" (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 Nylon fabric-reinforced
Seals: NBR
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
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Pilot Standard Materials:
Body: Brass, Bronze or Stainless Steel
Elastomers: NBR
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: Waterworks

Size: 1½ - 32"

Primary Feature: Quick Pressure Relief

Additional Feature:

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

Multiple choices permitted

Pattern:

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

Body Material:

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

End Connections:

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

Coating:

Epoxy FB Blue	EB
Polyester Green	PG
Polyester Blue	PB
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 additional electric control additional feature is selected

Tubing & Fittings:

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

Additonal Attributes:

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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Solenoid Controlled Valve

- Network management optimizing
- Pressure zone isolating
- Burst excess flow shut-off
- Reservoir overflow safety backup
- Switching between "on-duty" valves
- Automatic refreshing of reservoirs

The Model 710 Solenoid Controlled Valve is a hydraulically operated, diaphragm actuated control valve that either opens fully or shuts off in response to electric signals.
For very low pressure applications, refer to the Full Powered Opening and Closing Model 710-B.

Features and Benefits

- **Line pressure driven**
  - Independent operation
  - No motor required
  - Long term drip tight sealing
- **Solenoid controlled**
  - Low power consumption
  - Low cost wiring
  - Wide ranges of pressures and voltages
  - Normally Open, Normally Closed or Last Position
- **In-line serviceable** – Easy maintenance
- **Double chamber**
  - Full powered opening (option "B") & closing
  - Non-slam closing characteristic
  - Protected diaphragm
- **Semi-straight flow** – Smooth flow characteristics
- **"Y" or angle, wide body** – Minimized pressure loss
- **Flexible design** – Easy addition of features

Major Additional Features

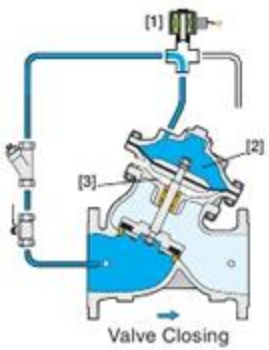
- Full powered opening & closing – **710-B**
- Check feature – **710-20**
- Opening & closing speed control – **710-03**
- Relief override – **710-3Q**
- Flow over the seat (fail-safe close) – **710-O**
- Closing surge prevention – **710-49**

See relevant BERMAD publications.

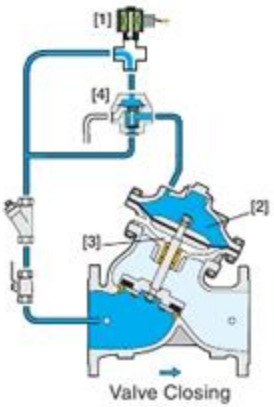
Operation

The Model 710 is a solenoid controlled valve equipped with a 3-Way solenoid pilot.
The normally open solenoid **[1]** applies pressure to the upper control chamber **[2]**, harnessing valve differential pressure to power the diaphragm actuator, closing the main valve. Energizing the solenoid vents control chamber pressure, causing the main valve to open fully. The lower control chamber **[3]** is open to the atmosphere.
In cases where pipeline water is contaminated (corrosive, debris laden) external control fluid is often used.
For 10" and larger valves, an accelerator **[4]** quickens valve response.

Size Range 1½-8"



Size Range 10-20"



Engineer Specifications

The Solenoid Controlled Valve shall either open fully or shut off in response to electric signals.

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 actuator assembly shall not consist of any closing spring nor spring-like device. 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 3-Way solenoid pilot valve (for 10" and larger valves, an accelerator shall be added to the solenoid), an isolating cock valve, and a filter. The assembled valve shall be hydraulically tested.

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

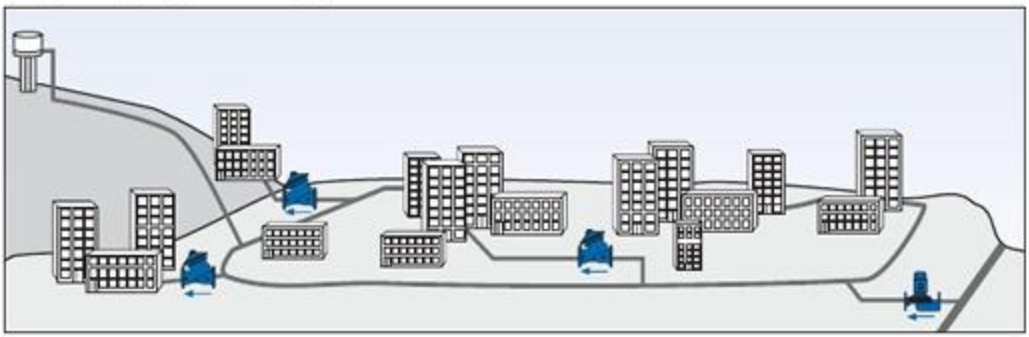
Typical Applications

Complex Distribution Networks

In complex distribution networks, management optimization of sources and consumers is essential:

- Sources are of various qualities and costs
- Source quality varies throughout the year
- Consumers demand various qualities
- Zones require isolation for maintenance
- Burst occurrence requires management
- Reservoirs call for systematic refreshing

The Model 710 is well suited to meet all the above needs and more. It should be included for placement in multiple locations during the design stage or with changing needs.



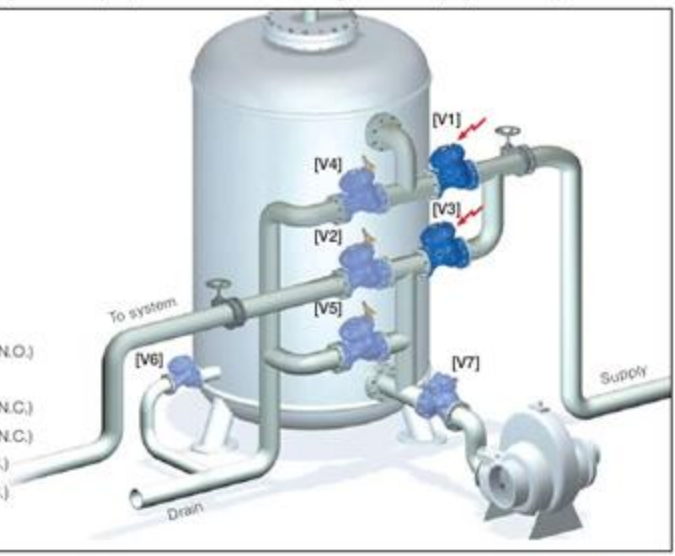
Filtration Systems

In a filter battery installed as part of a water treatment system, each filter requires periodic back flushing. This process entails reversing the direction of flow through each filter. Two Model 710 valves **[V1]** & **[V3]**, installed upstream from each filter, enable this reversal. The "untreated water valve" **[V1]** is Normally Open and the "back flushing inlet valve" **[V3]** is Normally Closed.

Filtration Process Control Valves:

[V1]	**Untreated water inlet**	**- Model 710 (N.O.)**
[V2]	Treated water outlet	- Model 770-55-U (N.O.)
[V3]	**Back flushing inlet**	**- Model 710 (N.C.)**
[V4]	Back flushing outlet	- Model 727-55-U (N.C.)
[V5]	Rinse water outlet	- Model 727-55-U (N.C.)
[V6]	Scrubbing level drain	- Model 710-B (N.C.)
[V7]	Air scrubbing inlet	- Model 710-B (N.C.)

See relevant BERMAD publications.



700 Series

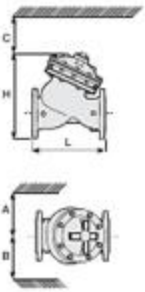
Model 710

Technical Data

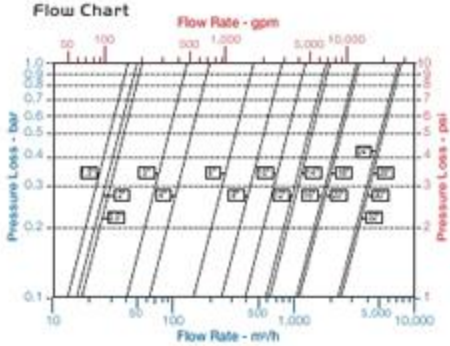
Dimensions and Weights

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	10.8	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	12.8	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 disk 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 Nylon fabric-reinforced
Seals: NBR
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
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Solenoid Standard Materials:
Body: Brass or Stainless Steel
Elastomers: NBR or FPM
Enclosure: Molded epoxy
Solenoid Electrical Data:
Voltages:
(ac): 24, 110-120, 220-240, (50-60 Hz)
(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

Solenoid Selection

Valve Size	Solenoid Model 330 (2.0 mm)	Solenoid Model 311 (1.0 mm)	Accelerator Model 54	Accelerator Model 58
1½-8"	■			
1½-6"		■		
10-20"	■		■	
8-20"		■	■	
24 -32"	■			■
24 -32"		■		■
	PN 16		PN 25	

Accelerator Standard Materials:
Body: Brass or Stainless Steel
Internals: Stainless Steel & Brass
Elastomers: NBR or FPM

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"	710	00	Y	C	16	EB	4AC	CB	I

Waterworks | 1½ - 32" | Solenoid Controlled

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

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

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

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

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

Double Chamber	B
Valve Position Indicator	I
Large Control Filter	F
Electric Limit Switch	S
Flow Over the Seat	O
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

No Additional Feature	00
Closing and Opening Speed Control	03
Check Valve	20
Relief Override	3Q
Closing Surge Prevention	49

Multiple choices permitted

Multiple choices permitted

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Solenoid Controlled Valve

with Check Feature

- Network management optimizing
- Pressure zone isolating
- Zonal pressure backup
- Zonal return flow prevention
- Automatic refreshing of reservoirs
- Burst excess flow shut-off
- Switching between "on-duty" valves

The Model 710-20 Solenoid Controlled Valve with Check Feature is a hydraulically operated, diaphragm actuated control valve that either opens fully or shuts off in response to electric signals. The check feature prevents reverse flow through the valve.

Features and Benefits

- **Line pressure driven**
  - Independent operation
  - No motor required
  - Long term drip tight sealing
- **Solenoid controlled**
  - Low power consumption
  - Low cost wiring
  - Wide ranges of pressures and voltages
  - Normally Open, Normally Closed, or Last Position
- **Check feature**
  - Cost effective pumping
  - Zonal return flow prevention
  - Replacing line sized check valve
- **In-line serviceable** – Easy maintenance
- **Double chamber**
  - Non-slam closing characteristic
  - Protected diaphragm
- **Flexible design** – Easy addition of features

Major Additional Features

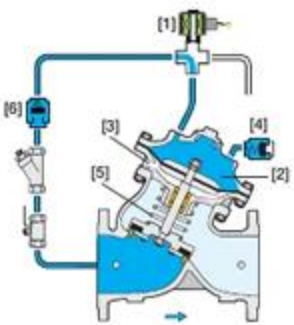
- Opening & closing speed control – **710-20-03**
- Relief override – **710-20-3Q**
- Closing surge prevention – **710-20-49**

See relevant BERMAD publications.

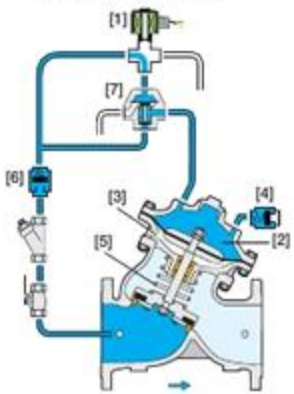
Operation

The Model 710-20 is a solenoid controlled valve equipped with a 3-Way solenoid pilot and two check valves.
The Normally Open solenoid **[1]** applies pressure to the upper control chamber **[2]**, harnessing valve differential pressure to power the diaphragm-actuator, closing the main valve. Energizing the solenoid vents control chamber pressure causing the main valve to open fully. The lower control chamber **[3]** is open to atmosphere.
Should downstream pressure exceed upstream pressure while the valve is open, check valve **[4]** quickly admits air into the upper control chamber enabling the valve to rapidly close by the spring **[5]** force. Check valve **[6]** provides a "Check Lock" feature. In cases where pipeline water is contaminated (corrosive, debris laden) external control fluid is often used.
For 10" and larger valves, an accelerator **[7]** quickens valve response.

Size Range 1½-8"



Size Range 10-20"



Engineer Specifications

The Solenoid Controlled Valve shall either open fully or shut off in response to electric signals, and shall prevent reverse flow.

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.

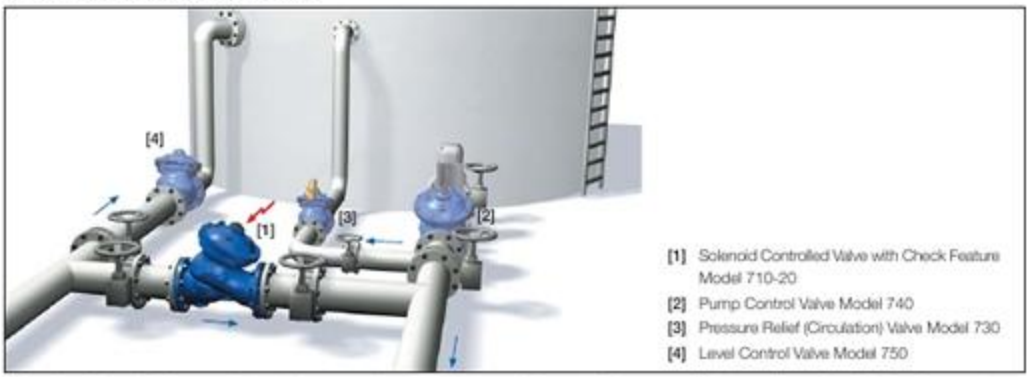
Actuator: The actuator assembly shall be double chambered with an inherent separating partition between the lower surface of the diaphragm and the main valve. The entire actuator assembly (seal disk to top cover) shall be removable from the valve as an integral unit. The stainless steel valve shaft shall 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 3-Way solenoid pilot valve (for 10" and larger valves, an accelerator shall be added to the solenoid), two check valves, an isolating cock valve, and a filter. The assembled valve shall be hydraulically tested.

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

Typical Applications

Automatic Refreshing of Reservoirs



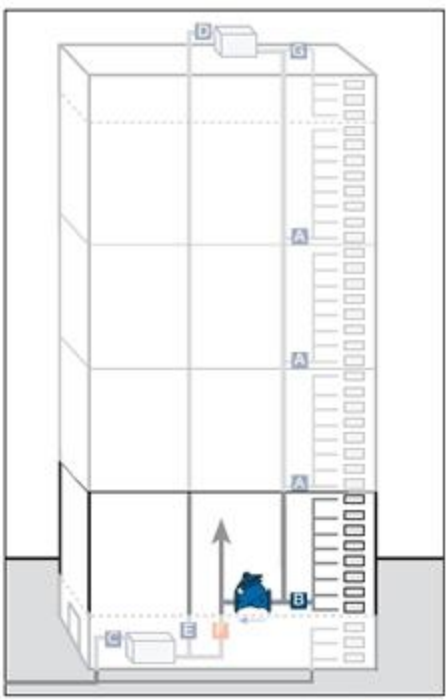
[1] Solenoid Controlled Valve with Check Feature Model 710-20
[2] Pump Control Valve Model 740
[3] Pressure Relief (Circulation) Valve Model 730
[4] Level Control Valve Model 750

This valve is installed as a short cut between the reservoir supply line and the pump discharge line to the distribution system. The Model 710-20 presents three major advantages:

- Saving energy and expensive pumping hours when supply pressure is sufficient
- Enabling automatic refreshing of water in the reservoir
- Ensuring uninterrupted supply during reservoir maintenance

High-Rise Building Zonal Pressure Backup

In high-rise buildings, availability of all water resources for fire extinguishing is a critical design requirement.
In cases where pumping is stopped due to mechanical, electrical or supply failures, the Model 710-20 enables backup of pumped water by routing roof reservoir water to the fire extinguishing system.
The Check Feature prevents back flow of fire water during normal operation.



- 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

BERMAD Waterworks

700 Series

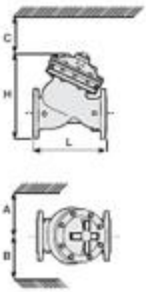
Model 710-20

Technical Data

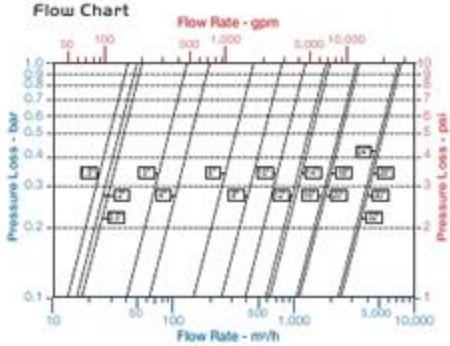
Dimensions and Weights

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	10.8	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	12.8	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 disk valves
For more flow charts, refer to Engineering Section

Main Valve

Valve Patterns: "Y" (globe) & angle
Size Range: 1"/₂–32" (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 Nylon fabric-reinforced
Seals: NBR
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
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Solenoid Standard Materials:
Body: Brass or Stainless Steel
Elastomers: NBR or FPM
Enclosure: Molded epoxy
Solenoid Electrical Data:
Voltages:
(ac): 24, 110-120, 220-240, (50-60 Hz)
(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

Solenoid Selection

Valve Size	Solenoid Model 330 (2.0 mm)	Solenoid Model 311 (1.0 mm)	Accelerator Model 54	Accelerator Model 58
1½-8"	■			
1½-6"		■		
10-20"	■		■	
8-20"		■	■	
24 -32"	■			■
24 -32"		■		■
	PN 16		PN 25	

Accelerator Standard Materials:
Body: Brass or Stainless Steel
Internals: Stainless Steel & Brass
Elastomers: NBR or FPM

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"	710	20	Y	C	16	EB	4AC	CB	I

Waterworks | 1½ - 32" | Solenoid Controlled

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

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

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

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

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

Valve Position Indicator I
Large Control Filter F
Electric Limit Switch S
Flow Over the Seat O
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

No Additional Feature 00
Closing and Opening Speed Control 03
Check Valve 20
Relief Override 3Q
Closing Surge Prevention 49

Multiple choices permitted

Multiple choices permitted

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Powered Opening Solenoid Controlled Valve

- Zero pressure system control
- Network management optimizing
- Low pressure burst excess flow shut-off
- Reservoir distribution routing
- Filter drain-off prior to air scrubbing
- Gravity filter bed outlet control
- Sewerage "fill and flush" systems

The Model 710-B Powered Opening Solenoid Controlled Valve is a double chambered, hydraulically operated, diaphragm actuated control valve that either opens fully, regardless of valve differential pressure, or shuts off in response to electric signals.

Features and Benefits

- **Line pressure driven**
  - Independent operation
  - No motor required
  - Long term drip tight sealing
- **Solenoid controlled**
  - Low power consumption
  - Low cost wiring
  - Wide ranges of pressures and voltages
  - Normally Open, Normally Closed or Last Position
- **In-line serviceable** – Easy maintenance
- **Double chamber**
  - Full powered opening and closing
  - Non-slam closing characteristic
  - Protected diaphragm
- **Semi-straight flow** – Smooth flow characteristics
- **"Y" or angle, wide body** – Minimized pressure loss
- **Flexible design** – Easy addition of features

Major Additional Features

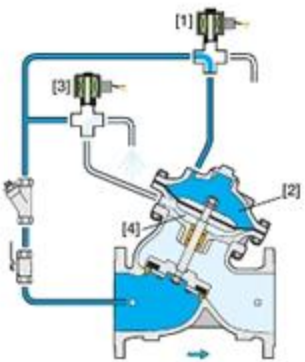
- Opening & closing speed control – **710-03-B**
- Relief override – **710-3Q-B**
- Flow over-the-seat (fail-safe close) – **710-BO**
- Closing surge prevention – **710-49-B**

See relevant BERMAD publications.

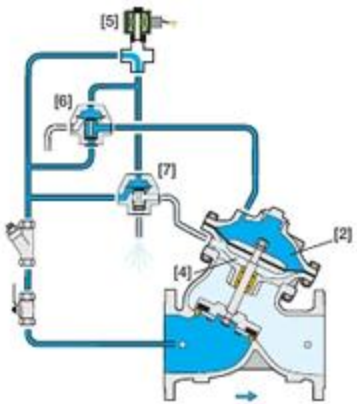
Operation

The Model 710-B is a solenoid controlled valve equipped with two 3-Way solenoid pilots.
The Normally Open solenoid **[1]** applies pressure to the upper control chamber **[2]**, harnessing line pressure to power the diaphragm actuator while the Normally Closed solenoid **[3]** vents the lower control chamber **[4]**, closing the main valve.
Energizing the solenoids vents the upper control chamber pressure while applying line pressure to the lower control chamber, causing the main valve to powerfully open.
In cases where pipeline water is contaminated (corrosive, debris laden) or where vacuum conditions exist, external control fluid is often used.
For 10" and larger valves, a single solenoid **[5]** commands two accelerators **[6]** & **[7]** (replacing solenoids **[1]** & **[3]** used for the smaller valves) to powerfully open and close the main valve.

Size Range 1½-8"



Size Range 10-20"



Engineer Specifications

The Powered Opening Solenoid Controlled Valve shall either open fully, regardless of valve differential pressure, or shut off, in response to an electric signal.

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.

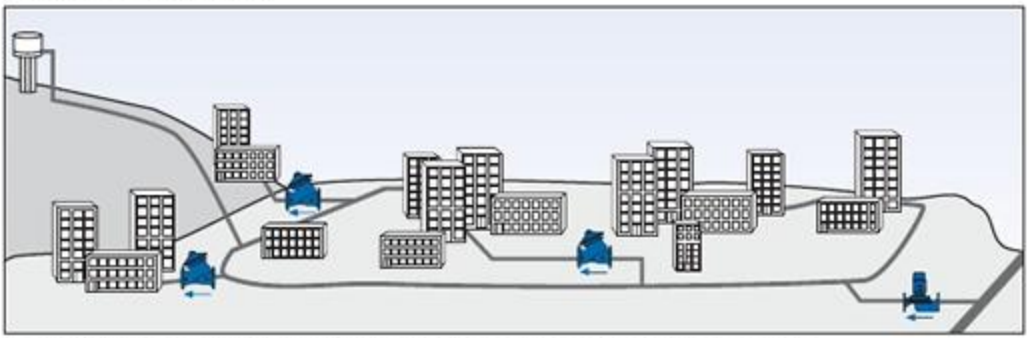
Actuator: The actuator assembly shall be double chambered with an inherent separating partition between the lower surface of the diaphragm and the main valve. The actuator assembly shall not consist of any closing spring nor spring-like device. The entire actuator assembly (seal disk to top cover) shall 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: For sizes 1½-8", the control system shall consist of two 3-Way solenoids, an isolating cock valve, and a filter. For sizes 10" and larger, the control system shall consist of one 3-Way solenoid, two accelerators, isolating cock valve, and a filter. 4/2 and 5/2 solenoids shall be acceptable as well. 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 main valve shall be certified as a complete drinking water valve according to NSF, WRAS, and other recognized standards.

Typical Applications

Complex Distribution Networks



In complex distribution networks, management optimization of sources and consumers is essential:

- Sources are of various qualities and costs
- Source quality varies throughout the year
- Consumers demand various qualities
- Zones require isolation for maintenance
- Burst occurrence requires management
- Reservoirs call for systematic refreshing

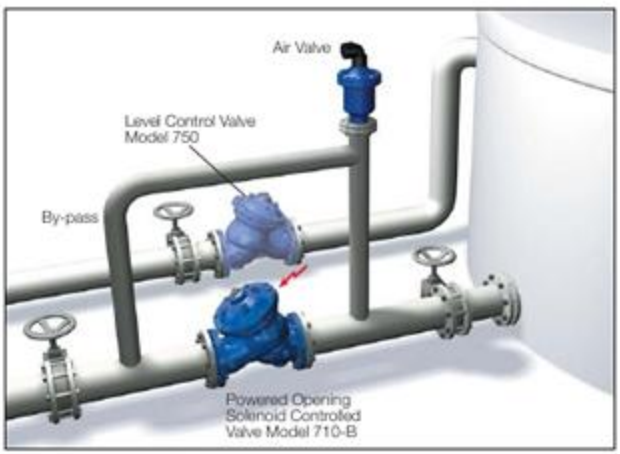
Low pipeline pressure normally exists at reservoir sites and sometimes occurs at other system points. The Model 710-B, as a powered opening valve, is well suited to meet all the above needs and more, even at very low line pressure.

It should be included for placement in multiple locations during the design stage or with changing needs.

Reservoir Outlet Routing

In this reservoir system, the level is normally allowed to drop only as far as the level limiting by-pass. The Model 710-B fully opens, at near zero head, to allow flow of lower level "reserve" water for high priority or emergency services. In other reservoir contexts, the Model 710-B fulfills several other functions:

- Routing to multiple consumers, such as pumping station, lower lying consumers, other reservoirs and more
- Reservoir outlet shut-off upon distribution system burst
- Connection between two reservoirs when head differential is sometimes near zero

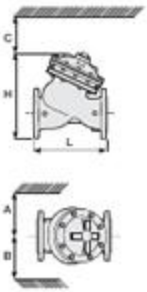


Technical Data

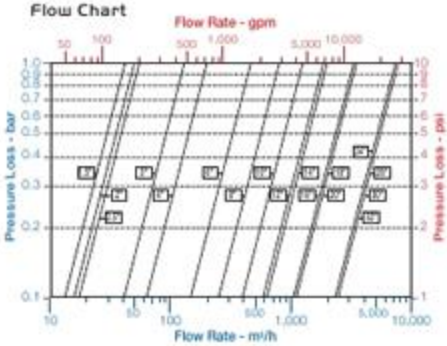
Dimensions and Weights

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 disk 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 Nylon fabric-reinforced
Seals: NBR
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
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Solenoid Standard Materials:
Body: Brass or Stainless Steel
Elastomers: NBR or FPM
Enclosure: Molded epoxy
Solenoid Electrical Data:
Voltages:
(ac): 24, 110-120, 220-240, (50-60 Hz)
(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

Solenoid Selection

Valve Size	Solenoid Model 330 (2.0 mm)	Solenoid Model 311 (1.0 mm)	Accelerator Model 54	Accelerator Model 56
1½-8"	■■			
1½-6"		■■		
10-20"	■			
8-20"		■		
24 -32"	■			■■
24 -32"		■		■■
	PN 16		PN 25	

Option: 4/2 solenoid with manual override is available for size range 1½-20", maximum operating pressure: 6.5 bar (100 psi), 24V AC only.

Accelerator Standard Materials:
Body: Brass or Stainless Steel
Internals: Stainless Steel & Brass
Elastomers: NBR or FPM

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"	710	00	Y	C	16	EB	4AC	CB	BI

Sector: Waterworks
Size: 1½ - 32"
Primary Feature: Powered Opening Solenoid Controlled Valve

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:
- Epoxy FB Blue EB
- Polyester Green PG
- Polyester Blue PB
- 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

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

Additional Features:
- No Additional Feature 00
- Closing and Opening Speed Control 03
- Relief Override 3Q
- Closing Surge Prevention 49

Multiple choices permitted

Additonal Attributes:
- Double Chamber B
- Valve Position Indicator I
- Large Control Filter F
- Electric Limit Switch S
- Flow Over the Seat O
- 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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Electronic Control Valve

- Pressure control
- Flow control
- Leakage control
- Level control
- Temperature control
- Mixture control at mixing junction

The Model 718-03 Electronic Control Valve combines the advantages of an excellent modulating, line pressure driven, hydraulic control valve with the advantages of electronic control. This valve responds to signals from the electronic controller BERMAD BE (optional), by changing its opening position according to the set values programmed into the controller.
For very low pressure applications, refer to the full powered opening and closing Model 718-03-B

Features and Benefits

- **Line pressure driven** – Independent operation
- **Solenoid controlled**
  - Low power consumption
  - Wide ranges of pressures and voltages
  - Normally Open, Normally Closed or Last Position
- **Electronic Controller compatible**
  - Local & remote modification of set values
  - Suitable for conventional PLC methods
  - Data logging
- **In-line serviceable** – Easy maintenance
- **Double chamber**
  - Full powered opening (option "B") and closing
  - Non-slam closing characteristic
  - Protected diaphragm
- **Semi-straight flow** – Smooth flow characteristics
- **Stainless Steel raised seat** – Cavitation damage resistant
- **V-Port Throttling Plug** – Low flow stability
- **Flexible design** – Easy addition of features

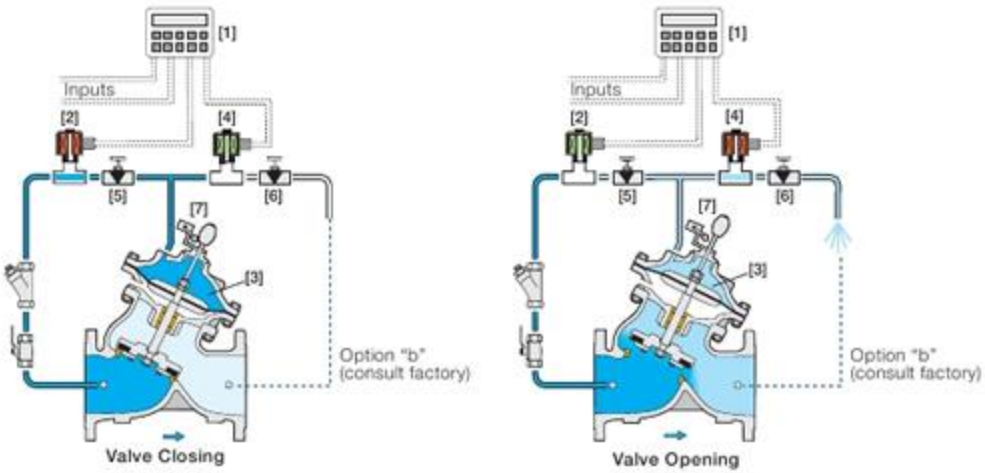
Major Additional Features

- Full powered opening & closing – **718-03-B**
- Downstream over pressure guard – **718-03-48**
- Relief override – **718-03-3Q**
- Check feature – **718-03-20**
- Flow-over-the-seat (fail-safe close) – **718-03-O**

See relevant BERMAD publications.

Operation

The Model 718-03 is a Electronic Control Valve equipped with two 2-Way solenoid pilots.
The interaction between the two solenoids determines the required opening position as signaled by the dedicated electronic controller (optional BERMAD BE) **[1]**. The upstream solenoid **[2]** applies pressure to the upper control chamber **[3]** harnessing valve differential pressure to power the diaphragm actuator to a more closed position. The downstream solenoid **[4]** vents upper control chamber pressure resulting in a more open main valve. Needle valves **[5]** & **[6]** control the closing and opening speed of the valve. Valve position can be provided by either an optional limit switch **[7]**, or an analog transducer.
In cases where pipeline water is contaminated (corrosive, debris laden) external control fluid is often used.



Engineer Specifications

The Electronic Control Valve shall respond to electric commands by changing its opening position to control a measurable characteristic (pressure, flow, level, salinity, temperature and others).

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, non-threaded, 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 actuator assembly shall not consist any closing spring nor spring-like device. 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 centrally 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 2-Way solenoid pilot valves, isolating cock valves, two needle valve and a filter. All fittings shall be forged brass or stainless steel.
The assembled valve shall be hydraulically tested to customer requirements.

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

Electronic Control of a Variable as a Function of Another Variable

This control method is suitable for those applications that require dynamic control of a dependant variable as a programmable function of a governing variable, is required. The system includes a Model 718-03 Electronic Control Valve, a dedicated electronic controller (optional BERMAD BE), and two transducers (one for each variable).

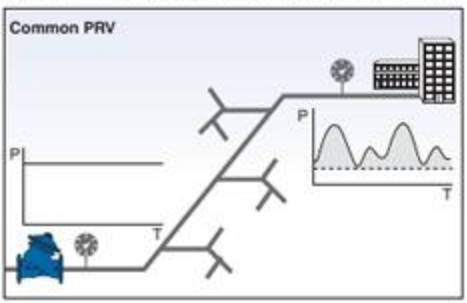
The controller receives continuous inputs from both transducers and corrects the valve opening in response to a comparison with the set value according to a programmed function.

This system can be used for a wide range of applications including:

- **Leakage control** – Pressure control as a function of flow (see below)
- **Reservoir applications** – Inlet or outlet flow control as a function of reservoir level
- **Heating and cooling systems** – Flow control as a function of temperature or ΔP

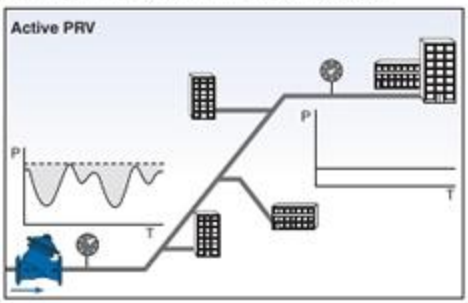
Leakage Control

Optimum network design requires active adjustment of the system set pressure to the minimum possible level.



Common PRVs are set to keep the downstream pressure constant, ensuring sufficient pressure at the system critical point during "peak" demand (when line friction head loss is highest).

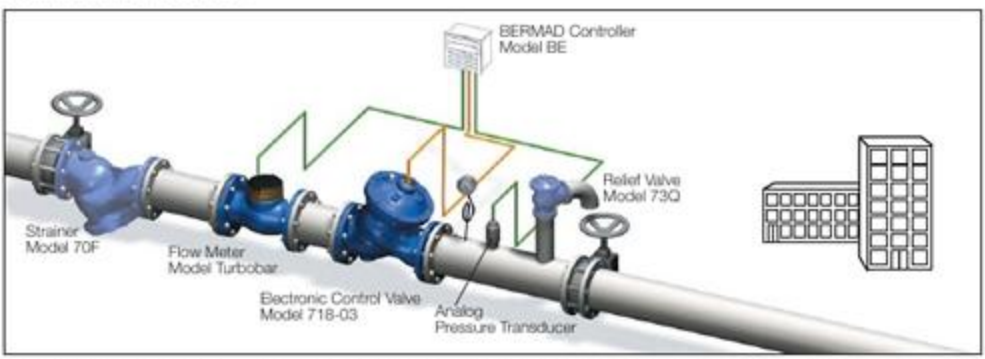
The shaded area represents the hours and levels when pressure is higher than required.



The Model 718-03 and controller continuously corrects the PRV's set value to ensure the minimum required pressure at the system critical point. As a result, the average network pressure dramatically decreases, reducing system leakage flow, burst, maintenance, energy and chemical costs.

The shaded area represents the hours and levels when leakage is reduced.

Leakage Control Installation



Data logging and analysis of the distribution network parameter values enable establishing a function for real time adjustment of pressure according to system demand. The flow and pressure transducers continuously transmit to the controller which reacts by adjusting the Model 718-03 according to the pre-established function.

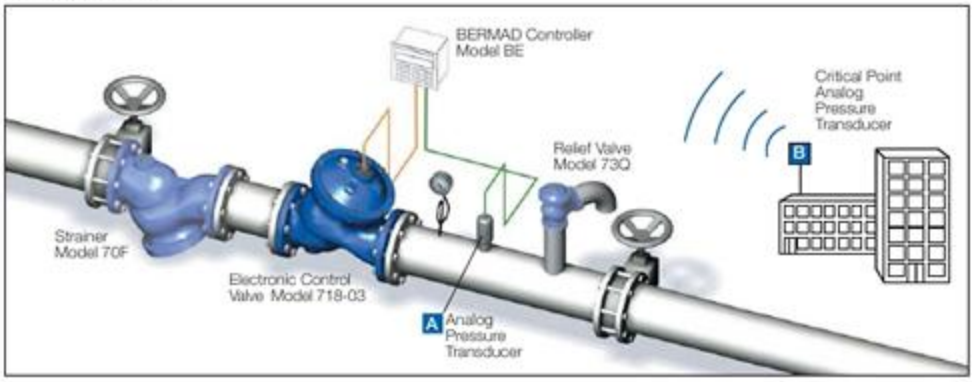
Electronic Control of a Single Variable

This method is suited for those applications where dynamic control of a variable is required. The system includes a Model 718-03 Electronic Control Valve, a dedicated electronic controller (optional BERMAD BE), and an analog transducer. The controller receives continuous inputs from the analog transducer and corrects the valve opening in response to a comparison with the programmable set value. The set value can be changed either manually on the controller keyboard or remotely through PC, SMS or any other communication methods.

This system can be used for a wide range of applications including:

- **Pressure control** (see below)
- **Flow control**
- **Level control**

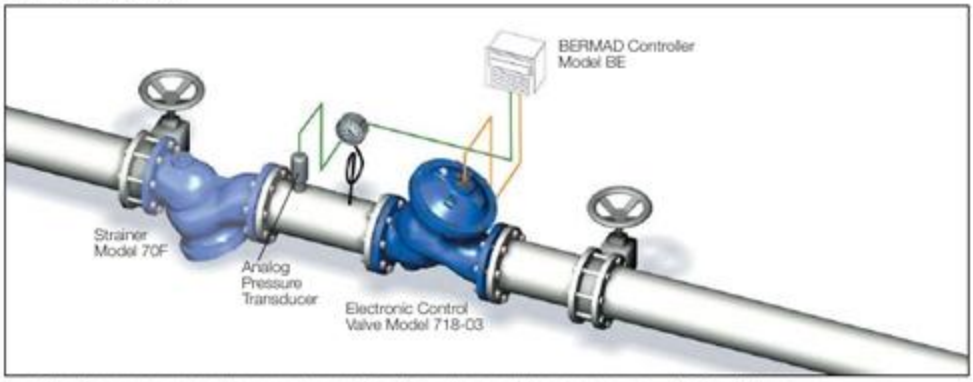
Pressure Reducing



Installing the pressure transducer downstream from the valve provides a pressure reducing feature.
Either of two methods can be applied:

- Local pressure control as transmitted by pressure transducer **A**.
- Remote pressure control as transmitted by critical point pressure transducer **B**.

Pressure Sustaining



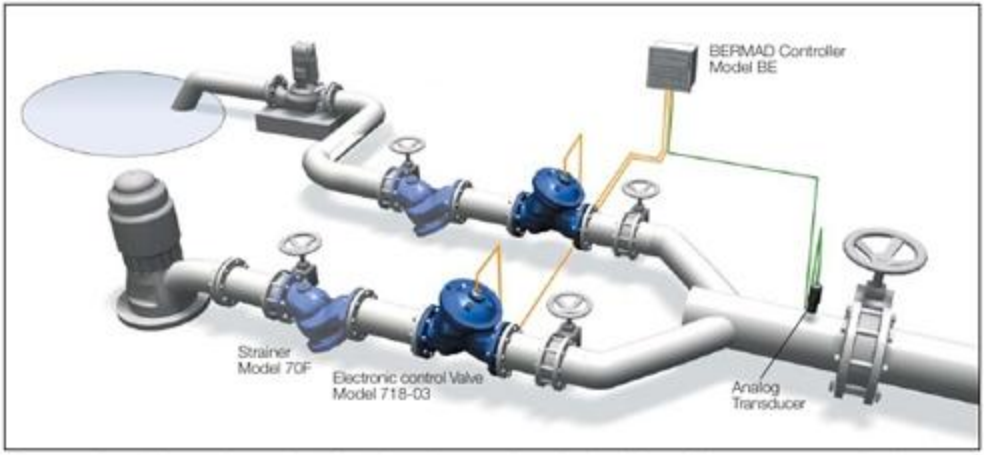
Installing the pressure transducer upstream from the valve provides a pressure sustaining feature:

- Sustaining pump discharge pressure
- Sustaining pump suction pressure
- Sustaining circulated discharge pressure
- Sustaining reservoir or canal level

Electronic Control of Mixing Junctions

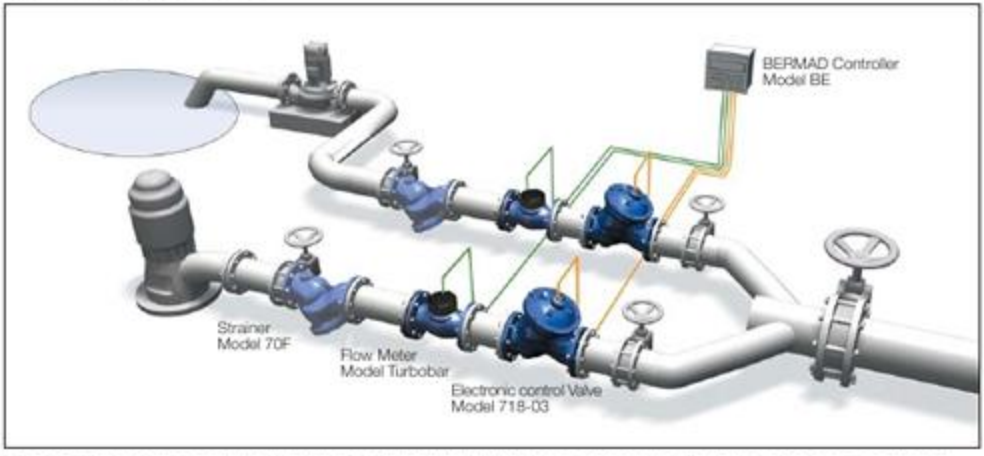
This method is suited for dynamic control of two parallel valves controlling the two separate sources of a mixing junction. These systems include two Model 718-03 Electronic Control Valves, and a dedicated electronic controller (optional BERMAD BE). Two types of systems are used.

Type A - Sampling the Mixture



The controller receives continuous inputs from the analog transducer (conductivity, salinity, temperature etc.). and corrects, in real-time, the opening of each valve in comparison with the programmed value.

Type B - Sampling the Sources



The controller receives continuous inputs from both flow transducers and corrects, in real-time, the opening of each valve, thus maintaining constant flow ratio between the two sources to achieve the desired result.

- Combination of both **Types A and B** is available also

BERMAD Waterworks

700 Series

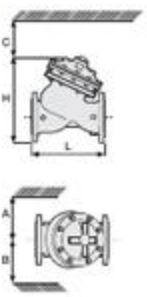
Model 718-03

Technical Data

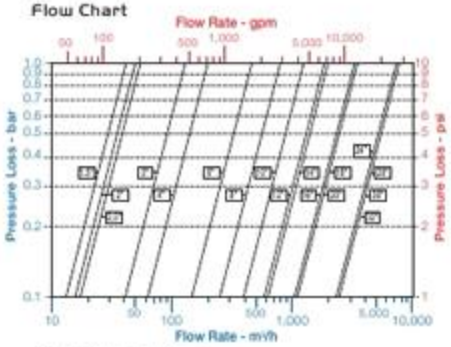
Dimensions and Weights

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	290	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	479
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 disk valves
For more flow charts, refer to Engineering Section

Main Valve

Valve Patterns: "Y" (globe) & angle
Size Range: 1"/₀-32" (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 Nylon fabric reinforced
Seals: NBR
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
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Solenoid Standard Materials:
Body: Brass or Stainless Steel
Elastomers: NBR or FPM
Enclosure: Molded epoxy
Solenoid Electrical Data:
Voltages:
(ac): 24, 110-120, 220-240, (50-60 Hz)
(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

Solenoid Selection

Valve Size	Solenoid Model			
	330	311	281	404
1½-8" (40-200 mm)	■			
1½-6" (40-150 mm)		■		
10-20" (250-500 mm)			■	
8-20" (200-500 mm)				■
24 -32" (600-800 mm)			■	
24 -32" (600-800 mm)				■

PN 16 | PN 25

The valve control loop consists of two solenoids

Solenoid Location	Main Valve Position		
	N.O.	N.C.	L.P.
Upstream (inlet)	N.C.	N.O.	N.C.
Downstream (outlet)	N.O.	N.C.	N.C.

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"	718	03	Y	C	16	EB	4AP	CB	VI

Waterworks | 1½ - 32" | Electronic Control

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

Voltage & Position	
24VAC/50Hz - N.C.	4AC
24VAC/50Hz - N.O.	4AO
24VAC/50Hz - L.P.	4AP
24VDC - N.C.	4DC
24VDC - N.O.	4DO
24VDC - L.P.	4DP
220VAC/50-60Hz N.C.	2AC
220VAC/50-60Hz N.O.	2AO

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

Additonal Attributes	
Powered opening & closing	B
Valve Position Indicator	I
V-Port Throttling Plug	V
Large Control Filter	F
Electric Limit Switch	S
Valve Position Transmitter	Q
Flow-Over-the-Seat	O
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

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

Multiple choices permitted

Multiple choices permitted

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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
- **Stainless Steel raised seat** – Cavitation damage resistant
- **Obstacle free, full bore** – Uncompromising reliability
- **V-Port Throttling Plug** – Low flow stability

Major Additional Features

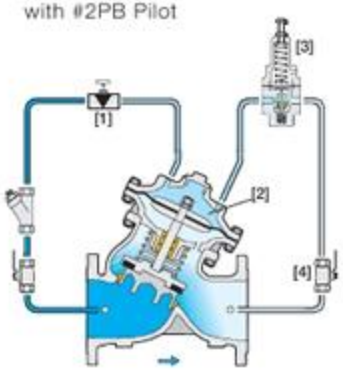
- UL Listed for fire protection – **FP-720-UL**
- Solenoid control – **720-55**
- Check valve – **720-20**
- Solenoid control & check valve – **720-25**
- Proportional – **720-PD**
- Automatic regulation override – **720-09**
- High sensitivity pilot – **720-12**
- Emergency pressure reducing valve – **720-PD-59**
- Downstream over pressure guard – **720-48**
- Electrically selected multi-level setting – **720-45**
- Electronic multi-level setting, Type 4T – **720-4T**
- Electronic pressure reducing valve – **728-03**

See relevant BERMAD publications.

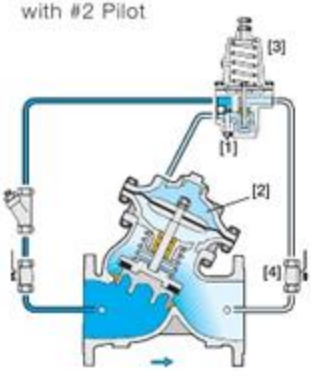
Operation

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.

1½-10"
with #2PB Pilot



6-14"
with #2 Pilot



Note: For 16" and larger valves, see "Pilot Valve Selection" table at the last page.

Engineer 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.

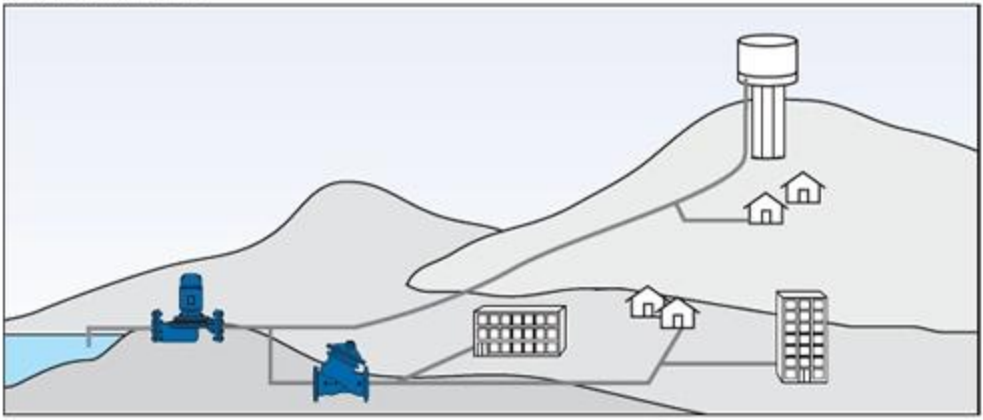
Control System: The control system shall consist of a 2-Way adjustable, direct acting, pressure reducing pilot valve, a needle valve, isolating cock valves, and a filter. All fittings shall be forged brass or stainless steel. The assembled valve shall be hydraulically tested and factory adjusted to customer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

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

Typical Applications

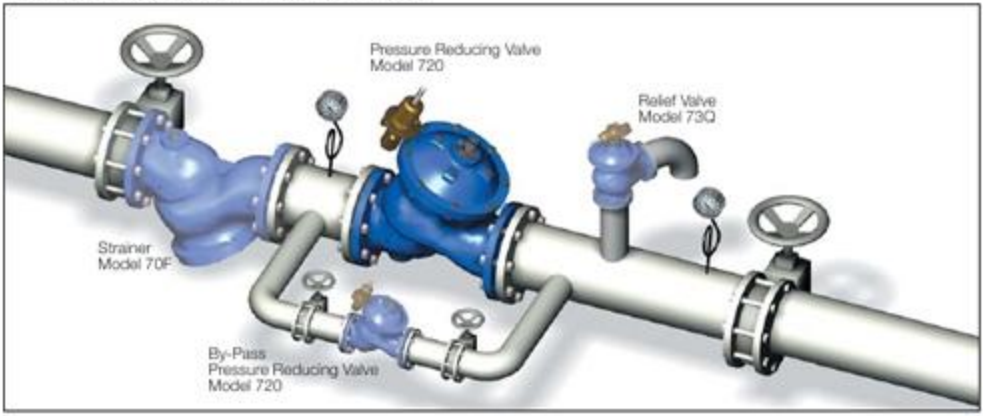
Pressure Reducing System for Municipal Networks

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 include:

- **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.

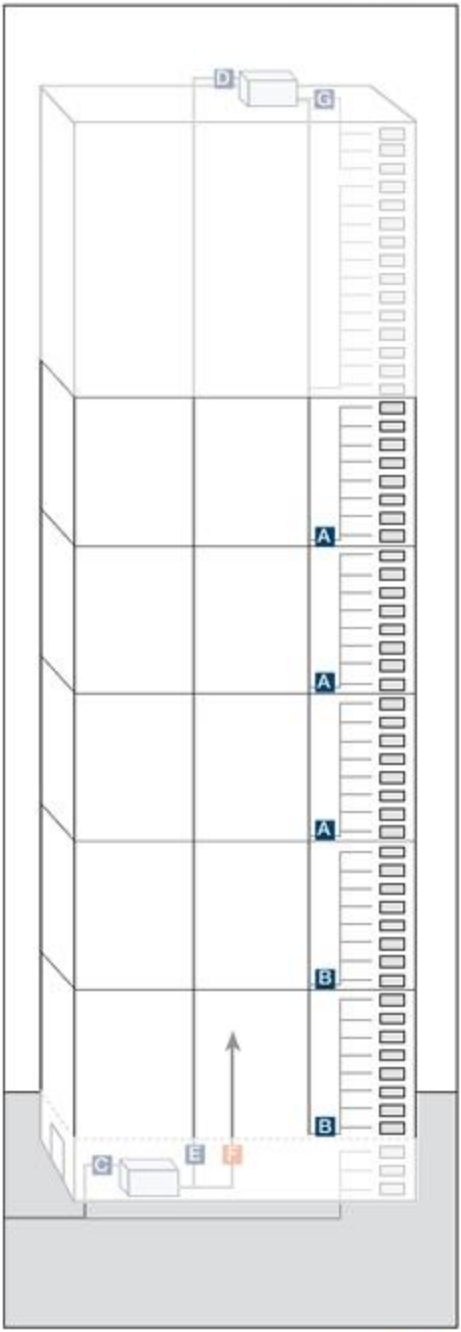
For high differential pressure systems, see BERMAD publication 720-PD Proportional Pressure Reducing Valve.
For high pressure systems, see BERMAD publication 820 Piston Actuated Pressure Reducing Valve.

Pressure Reducing Systems in High-Rise Buildings

Water supply system design requirements for high-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 high-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.

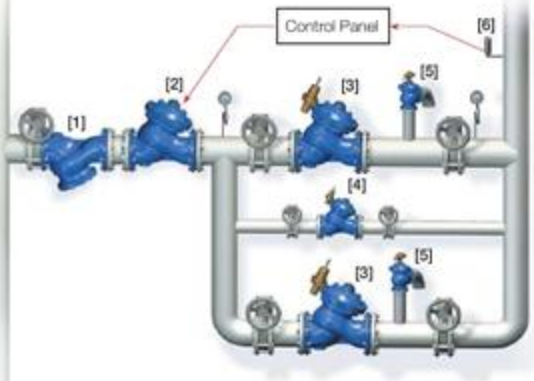


- **A** Higher zone pressure reducing system installation
- **B** Lower zone pressure reducing system (two-stage) installation
- **C** Bottom reservoir level control system
- **D** Roof reservoir level control system
- **E** Potable water pumping system
- **F** Fire protection pumping system
- **G**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

Higher Zone Installation A

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

- **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 and 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.

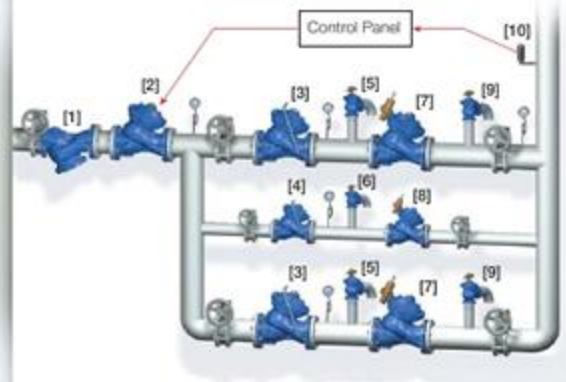


[1] Strainer Model 70F
[2] Emergency Pressure Reducing Valve Model 720-PD-59
[3] Pressure Reducing Valve Model 720
[4] By-pass Pressure Reducing Valve Model 720
[5] Relief Valve Model 73Q
[6] Pressure Switch

Lower Zone (Two-Stage) Installation B

When dealing with high differential pressure systems in lower zones of a high-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

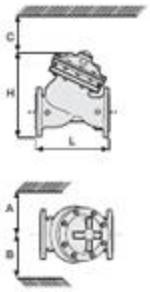
For high differential pressure systems, see BERMAD publication 720-PD Proportional Pressure Reducing Valve.
For high pressure systems, see BERMAD publication 820 Piston Actuated Pressure Reducing Valve.

Technical Data

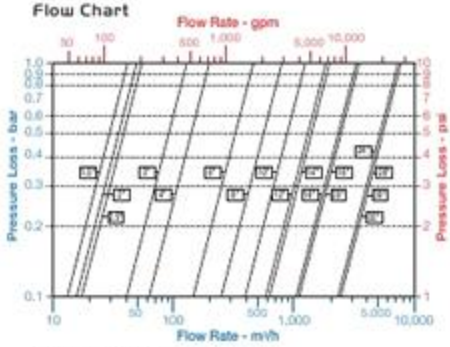
Dimensions and Weights

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	413	16.3	492	19.4	75	165
200	8"	475	19	460	18	505	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 disk 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 Nylon fabric-reinforced
Seals: NBR
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
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Pilot Standard Materials:
Body: Brass, Bronze or Stainless Steel
Elastomers: NBR
Springs: Galvanized Steel or Stainless Steel
Internals: Stainless Steel

Pilot Valve Selection

Valve Size	Pilot Setting (bar)	Pilot Type		
		#2PB	#2	#2HC
1½"-10" 40-250 mm	<15	■		
	>15		●	
6-14" 150-350 mm	<15		■	
	>15		●	
16 -32" 400-800 mm	<15			■
	>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
Waterworks	1½" - 32"	Pressure Reducing								

			No Additional Feature 00	Oblique (up to 20°) Y	Ductile Iron Standard C	Epoxy FB Blue EB		Copper Tubing & Brass Fittings CB	Valve Position Indicator I
			Closing and Opening Speed Control 03	Angle (up to 18°) A	Cast Steel S	Polyester Green PG		Plastic Tubing & Brass Fittings PB	V-Port Throttling Plug V
			Automatic Regulation Override 09	Globe (24-32" only) G	St. Steel 316 N	Polyester Blue PB		St. St. 316 Tubing & Fittings NN	Large Control Filter F
			High sensitivity pilot 12		Nickel Alumin. Bronze U	Uncoated UC			Electric Limit Switch S
			Check Valve 20						3-Way Control Loop X
			Solenoid Controlled & Check Valve 25		ISO-16 16	24VAC/50Hz - N.C. 4AC			Valve Position Transmitter Q
			Multi-Setting Levels - Electrically Selected 45		ISO-25 25	24VAC/50Hz - N.O. 4AO			St. St. 316 Control Accessories N
			Downstream Over Pressure Guard 48		ANSI-150 A5	24VDC - N.C. 4DC			St. St. 316 Internal Trim (Closure & Seat) T
			Hydraulic Control 50		ANSI-300 A3	24VDC - N.O. 4DO			St. St. 316 Actuator Internal Assembly D
			Solenoid Controlled 55		JIS-16 J6	24VDC - L.P. 4DP			Delrin Bearing R
			Electric Override 59		JIS-20 J2	220VAC/50-60Hz N.C. 2AC			Viton Elastomers for Seals & Diaphragm E
						220VAC/50-60Hz N.O. 2AO			Pressure Gauge 6
			Multiple choices permitted			Use when additional electric control feature is selected		Multiple choices permitted	

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Pressure Reducing Valve

with Check Feature

- Flow and leakage reduction
- Cavitation damage protection
- Return flow prevention
- Throttling noise reduction
- Burst protection

The Model 720-20 Pressure Reducing Valve with Check Feature 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. The check feature prevents reverse flow through the valve.

Features and Benefits

- **Line pressure driven** – Independent operation
- **Check feature**
  - Replacing line sized check valve
  - Cost effective pumping
  - One-way zonal back-up
- **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
- **Stainless Steel raised seat** – Cavitation damage resistant
- **Obstacle free, full bore** – Uncompromising reliability
- **V-Port Throttling Plug** – Low flow stability

Major Additional Features

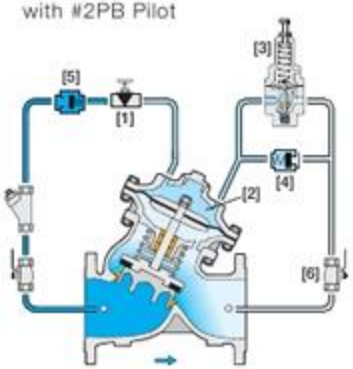
- Solenoid control & check valve – **720-25**
- Downstream over pressure guard – **720-20-48**
- High sensitivity pilot – **720-20-12**
- Electrically selected multi-level setting – **720-20-45**
- Electronic multi-level setting, Type 4T – **720-20-4T**
- Automatic regulation override – **720-20-09**

See relevant BERMAD publications.

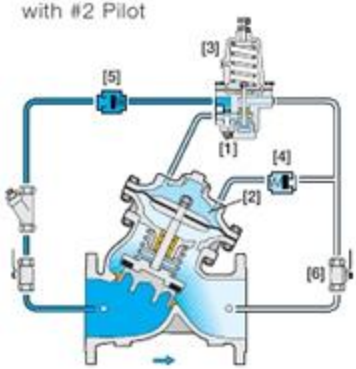
Operation

The Model 720-20 is a pilot controlled valve equipped with an adjustable, 2-Way, pressure reducing pilot and two check valves. The needle valve **[1]** continuously allows flow from 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 to accumulate in the upper control chamber, causing the main valve to throttle closed, decreasing downstream pressure to pilot setting.
Should downstream pressure exceed upstream pressure, check valve **[4]** allows downstream pressure into the upper control chamber while check valve **[5]** traps this pressure, together closing the main valve.
The needle valve controls the closing speed. The downstream cock valve **[6]** enables manual closing.

1¼-10"
with #2PB Pilot



6-14"
with #2 Pilot



Note: For 10" valves and larger, see "Pilot Valve Selection" table at the last page.

Engineer Specifications

The Pressure Reducing Valve with Check Feature shall reduce higher upstream pressure to lower preset downstream pressure regardless of fluctuating demand or varying upstream pressure and shall prevent reverse flow.

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 main valve shall be certified as a complete drinking water valve according to NSF, WRAS, and other recognized standards.

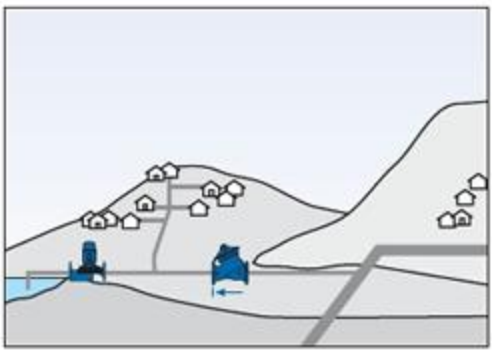
Typical Applications

Cost Effective Pumping

One zone of a distribution network has two supply sources. Setting the Model 720-20 Pressure Reducing Valve with Check Feature slightly higher than pump pressure, ensures pumping only when pressure provided from the network is insufficient.

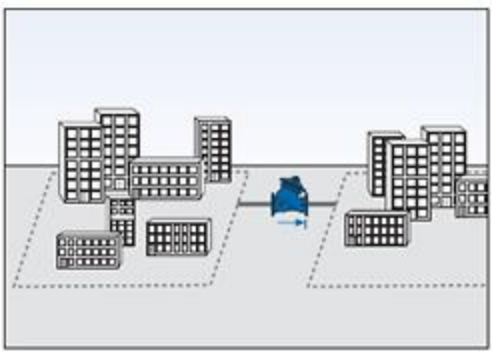
The Model 720-20:

- Protects the zone from excessive network supply pressure
- Saves energy and lowers costs by off-hours pumping



One-way Zonal Backup

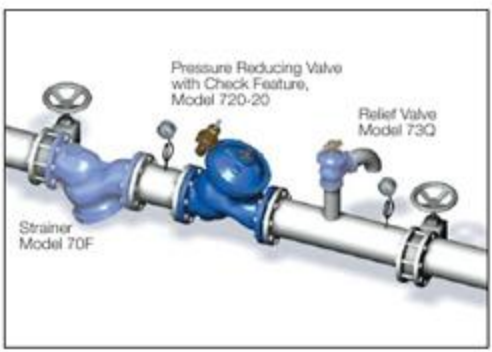
The Model 720-20 Pressure Reducing Valve with Check Feature, installed between two pressure zones, permits one zone to backup pressure supply to another zone while preventing reverse flow.



Typical Installation

In addition to the Model 720-20 Pressure Reducing Valve with Check Feature, BERMAD recommends the system also include:

- Strainer Model 70F, preventing debris from damaging valve operation
- Relief Valve Model 73Q, providing:
  - Protection against momentary pressure peaks
  - Visual indication of need for maintenance



For more information on BERMAD Pressure Reducing Systems, see BERMAD publication 720, Pressure Reducing Valve.

BERMAD Waterworks

700 Series

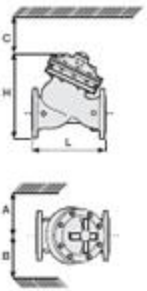
Model 720-20

Technical Data

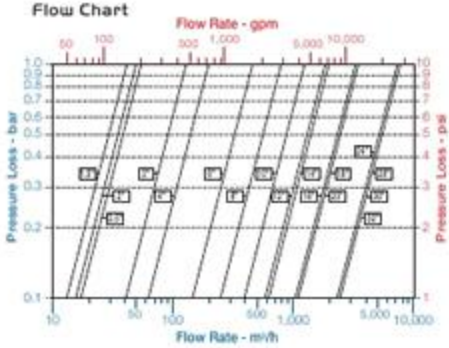
Dimensions and Weights

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	646	1860
450	18"	645	26	965	38	1000	39.4	1127	44.4	945	2083
500	20"	645	26	965	38	1105	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 disk 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 Nylon fabric-reinforced
Seals: NBR
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
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Pilot Standard Materials:
Body: Brass, Bronze or Stainless Steel
Elastomers: NBR
Springs: Galvanized Steel or Stainless Steel
Internals: Stainless Steel

Pilot Valve Selection

Valve Size	Pilot Setting (bar)	Pilot Type		
		#2PB	#2	#2HC
1½-10"	<15	■		
40-250 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	20	Y	C	16	EB	–	CB	VI

Sector: Waterworks

Size: 1½ - 32"

Primary Feature: Pressure Reducing

Additional Feature:

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 Control	50
Solenoid Controlled	55
Electric Override	59

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:

Epoxy FB Blue	EB
Polyester Green	PG
Polyester Blue	PB
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 additional electric control feature is selected

Tubing & Fittings:

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

Additonal Attributes:

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 Reducing Valve

with Solenoid Control

- Flow and leakage reduction
- Cavitation damage protection
- Pressure zone isolation
- Switching between "on-duty" valves
- Auto-refreshing of reservoirs

The Model 720-55 Pressure Reducing Valve with Solenoid Control 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. The valve opens and shuts off in response to an electric signal.

Features and Benefits

- **Line pressure driven** – Independent operation
- **Solenoid controlled**
  - Low power consumption
  - Wide ranges of pressures and voltages
  - Normally Open, Normally Closed or Last Position
- **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
- **Stainless Steel raised seat** – Cavitation damage resistant
- **Obstacle free, full bore** – Uncompromising reliability
- **V-Port Throttling Plug** – Low flow stability

Major Additional Features

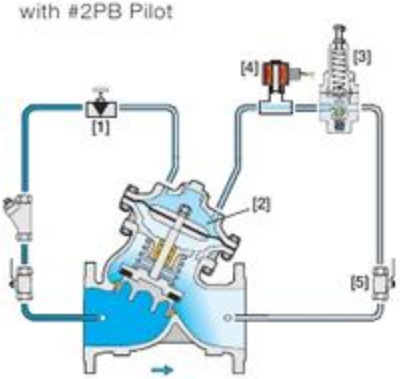
- Solenoid control & check feature – **720-25**
- Downstream over pressure guard – **720-55-48**
- High sensitivity pilot – **720-55-12**
- Electrically selected multi-level setting – **720-55-45**
- Electronic multi-level setting, Type 4T – **720-55-4T**
- Electric override – **720-55-59**

See relevant BERMAD publications.

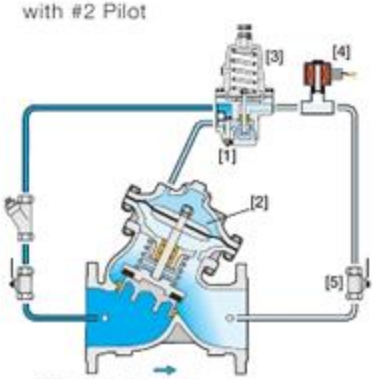
Operation

The Model 720-55 is a pilot controlled valve equipped with an adjustable, 2-Way, pressure reducing pilot and a solenoid pilot. The needle valve **[1]** continuously allows flow from the valve inlet into the upper control-chamber **[2]**. The pilot **[3]** senses downstream pressure, and the solenoid **[4]** together control outflow from the upper control chamber.
Should this pressure rise above pilot setting, the pilot throttles, enabling pressure to accumulate in the upper control chamber, causing the main valve to throttle closed, decreasing downstream pressure to pilot setting.
Should downstream pressure fall below pilot setting, the pilot releases the accumulated pressure and the main valve modulates open.
Should the solenoid close, pressure in the upper control chamber accumulates causing the main valve to shut off.
The needle valve controls the closing speed. The downstream cock valve **[5]** enables manual closing.
Normally closed, normally open and last position models are available.

1¼-10"
with #2PB Pilot



6-14"
with #2 Pilot



Note: For 16" and larger valves, see "Pilot Valve Selection" table at the last page.

Engineer Specifications

The Pressure Reducing Valve with Solenoid Control shall reduce higher upstream pressure to lower preset downstream pressure regardless of fluctuating demand or varying upstream pressure and shall open or shut off in response to an electric signal.

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.

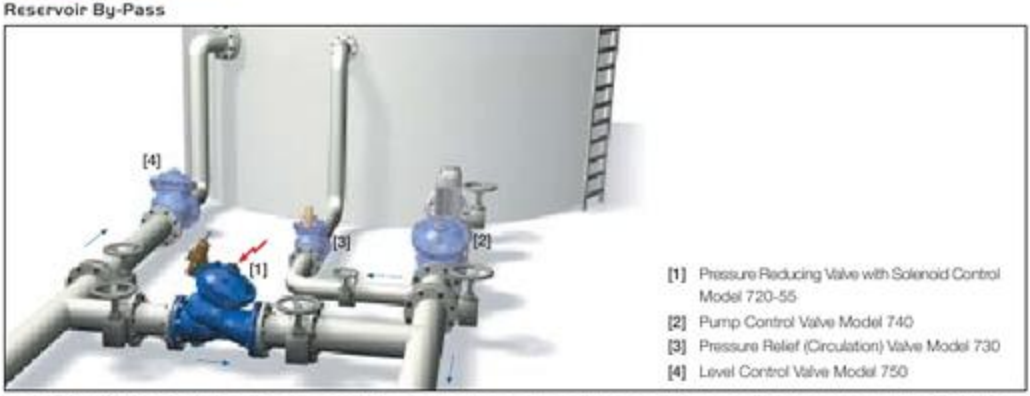
Actuator: The actuator assembly shall be double chambered with an inherent separating partition between the lower surface of the diaphragm and the main valve. The entire actuator assembly (seal disk to top cover) shall be removable from the valve as an integral unit. The stainless steel valve shaft shall 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 main valve shall be certified as a complete drinking water valve according to NSF, WRAS, and other recognized standards.

Typical Applications

Reservoir By-Pass



[1] Pressure Reducing Valve with Solenoid Control Model 720-55
[2] Pump Control Valve Model 740
[3] Pressure Relief (Circulation) Valve Model 730
[4] Level Control Valve Model 750

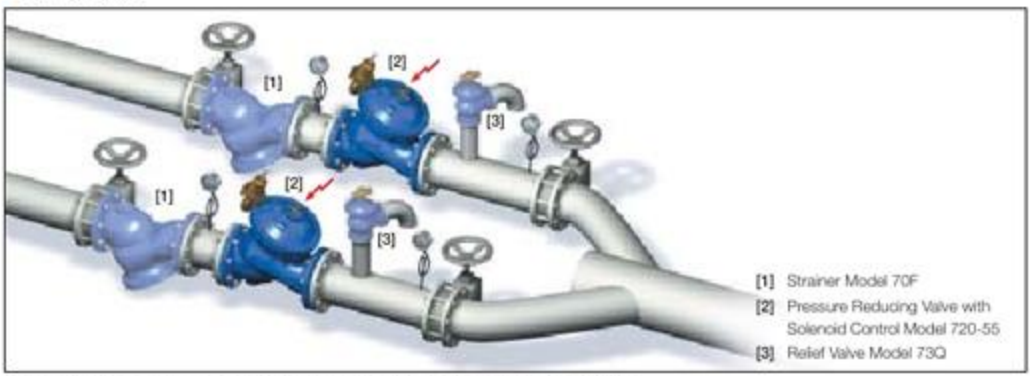
The Model 720-55 is installed as a by-pass between the reservoir supply line and the pump discharge line to the distribution network providing four major advantages:

- Saves energy and lowers costs by shortening pumping hours, when supply pressure is sufficient
- Protects the distribution network from excessive supply pressure
- Automatically refreshes the water in the reservoir by periodically forcing supply through reservoir
- Ensures uninterrupted supply during reservoir maintenance

Parallel or Multiple Sources

Where a distribution network is supplied by parallel and/or multiple sources, the solenoid controlled feature enables switching the "on-duty" valve and provides:

- Equalizing operating hours between valves
- Selecting source according to management considerations
- Isolating zones



[1] Strainer Model 70F
[2] Pressure Reducing Valve with Solenoid Control Model 720-55
[3] Relief Valve Model 73Q

To complete the system, BERMAD recommends that the system also include:

- **Strainer** Model 70F **[1]** preventing debris from damaging valve operation
- **Relief Valve** Model 73Q **[3]** providing:
  - Protection against momentary pressure peaks
  - Visual indication of need for maintenance

For more information on BERMAD Pressure Reducing Systems, see BERMAD publication 720, Pressure Reducing Valve.

BERMAD Waterworks

700 Series

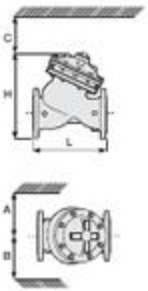
Model 720-55

Technical Data

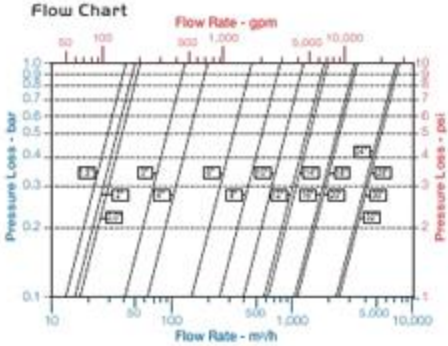
Dimensions and Weights

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	490	19	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	1106	43.6	848	1866
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 disk valves
For more flow charts, refer to Engineering Section

Main Valve

Valve Patterns: "Y" (globe) & angle
Size Range: 1"/₂-32" (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 Nylon fabric-reinforced
Seals: NBR
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
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Pilot Standard Materials:
Body: Brass, Bronze or Stainless Steel
Elastomers: NBR
Springs: Galvanized Steel or Stainless Steel
Internals: Stainless Steel

Pilot Valve Selection

Valve Size	Pilot Setting (bar)	Pilot Type		
		#2PB	#2	#2HC
1"/₂- 10"	<15	■		
40-250 mm	>15		●	
6-14"	<15		■	
150-350 mm	>15		●	
16 -32"	<15			■
600-800 mm	>15			●

■ Standard model ● with high pressure setting kit

Solenoid Standard Materials:

Body: Brass or Stainless Steel
Elastomers: NBR or FPM
Enclosure: Molded epoxy
Solenoid Electrical Data:
Voltages:
(ac): 24, 110-120, 220-240, (50-60Hz)
(dc): 12, 24, 110, 220
Power Consumption:
(ac): 30 VA, inrush; 15 VA (8W), holding or 70 VA, inrush; 40 VA (17.1W), holding
(dc): 8-11.6W

Values might vary according to specific solenoid model

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	55	Y	C	16	EB	4AC	CB	VI

Waterworks | 1"/₂ - 32" | Pressure Reducing

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

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

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

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

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

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

Multiple choices permitted

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Proportional Pressure Reducing Valve

- Long downhill lines
  - Serial pressure reduction
  - Leakage and burst protection
- High differential pressure systems
  - Protection against cavitation damage
  - Throttling noise reduction

The Model 720-PD Proportional Pressure Reducing Valve is a hydraulically operated, diaphragm actuated control valve that reduces higher upstream pressure to lower downstream pressure at a fixed ratio.

Features and Benefits

- **Line pressure driven** – Independent operation
- **Elegant simplicity**
  - Most cost effective
  - Simple to maintain
  - Minimal external accessories
- **Variety of reduction ratios** – Perfect mission matching
- **Built-in check feature** – Replacing line sized check valve
- **In-line serviceable** – Easy maintenance
- **Double chamber**
  - Moderated valve reaction
  - Protected diaphragm
- **Flexible design** – Easy addition of features
- **Semi-straight flow** – Non-turbulent flow
- **Stainless Steel raised seat** – Cavitation damage resistant
- **Obstacle free, full bore** – Uncompromising reliability
- **V-Port Throttling Plug** – Low flow stability

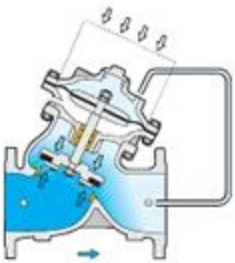
Major Additional Features

- Solenoid control – **720-PD-55**
- Closing & opening speed control – **720-PD-03**
- Emergency pressure reducing valve – **720-PD-59**
- Pressure sustaining – **723-PD**

See relevant BERMAD publications.

Operation

The Model 720-PD is a pilotless, double chambered, control valve. The downstream pressure is applied as the closing force on the top side of both the diaphragm and the seal disk areas. The upstream pressure is applied as the opening force on the bottom side of the seal disk area.
The net force, resulting from the two opposing dynamic forces acting on the actuator's diaphragm and seal, determines the degree to which the valve is open. The valve seeks the point where these forces are equal. As the ratio of the areas of the seal disk and the diaphragm is constant, the ratio of the upstream and downstream pressures is constant as well.
A rise in downstream pressure causes a momentary increase of the closing force. As a result, the valve throttles closed reducing downstream pressure according to the constant ratio.
Adding a V-Port Throttling Plug modifies valve ratio by increasing the effective diaphragm area.
When demand is zero, downstream pressure rises in proportion to the ratio, causing the valve to shut off.



Valve Regulates

Valve Closed (no system demand)

Engineer Specifications

The Proportional Pressure Reducing Valve shall reduce higher upstream pressure to lower downstream pressure at a fixed ratio. The valve's control loop shall not consist of any pilot.

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 a sealed 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.

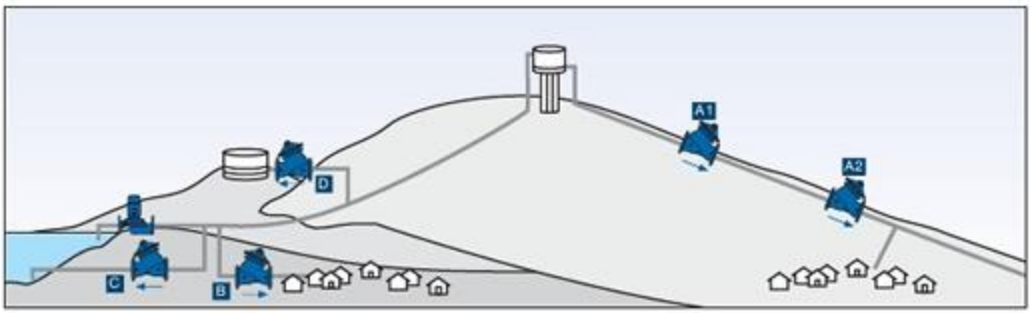
Control System: The control system shall consist of a control tube connecting the upper control chamber to the valve outlet. All fittings shall be forged brass or stainless steel. The assembled valve shall be hydraulically tested to customer requirements.

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

Typical Applications

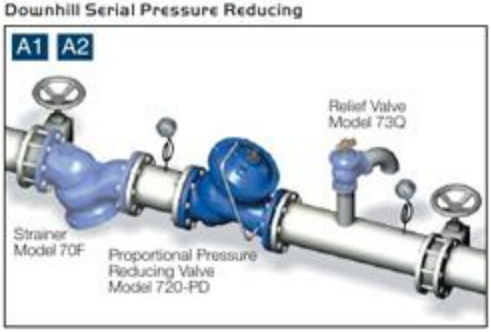
There are two major applications for the Model 720-PD Proportional Pressure Reducing Valve:

- Long downhill lines:
  - Systems A1 and A2 prevent the downhill line from exceeding its pressure rating.
- High differential pressure systems:
  - System B reduces cavitation damage and noise level by distributing the load of the high differential pressure.
  - System C illustrates protecting a circulation valve from high differential pressure and resultant severe cavitation.
  - System D shows protecting a level control valve from high differential pressure.

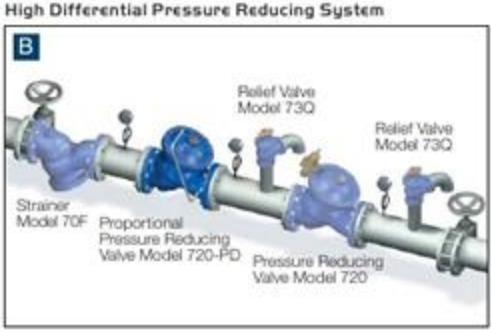


Typical Installations

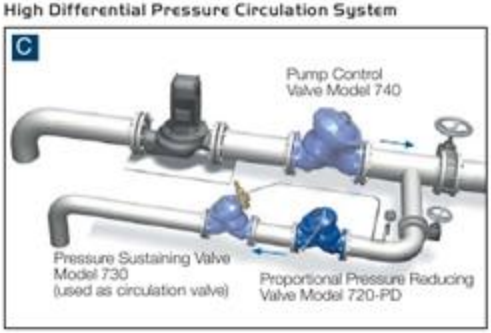
Downhill Serial Pressure Reducing



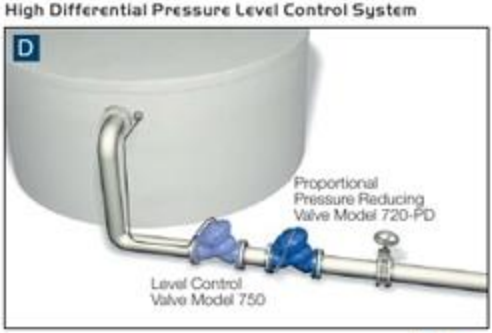
High Differential Pressure Reducing System



High Differential Pressure Circulation System



High Differential Pressure Level Control System

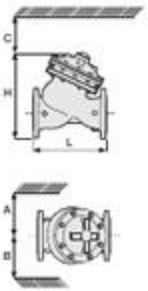


Technical Data

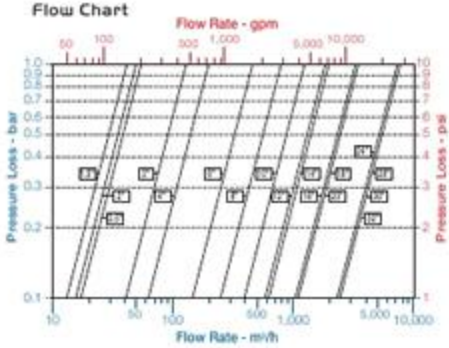
Dimensions and Weights

Size		A, B		C		L		H		Weight	
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	kg	lbs
40	1¼"	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	129	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	646	1860
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 disk valves
For more flow charts, refer to Engineering Section

Main Valve

Valve Patterns: "Y" (globe) & angle
Size Range: 1¼"-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 Nylon fabric-reinforced
Seals: NBR
Coating: Fusion Bonded Epoxy, RAL 5005 (Blue) NSF & WRAS approved or Electrostatic Polyester Powder, RAL 6017 (Green)

Reduction Ratios Table

Valve Size	Plug Type	
	Flat-Disc	V-Port
1¼"- 2½" 40- 65 mm	3.7	4.0
	2.5	2.7
3" 80 mm	2.6	2.9
	2.2	2.4
4" 100 mm	2.5	2.8
	2.0	2.2
6" 150 mm	2.5	2.7
	2.0	2.2
8" 200 mm	2.4	2.6
	2.0	2.2
10" 250 mm	2.3	2.5
	2.0	2.2
12-14" 300-350 mm	2.2	2.4
	2.0	2.2
16-20" 400-500 mm	2.2	2.3
	2.0	2.2

Standard ratio | Optional ratio

- The reduction ratios are based on flow velocity of 2.0-3.0 m/sec.
- Reduction ratio may vary at extreme flow velocity & upstream pressure.
- 24-32" (600-800 mm) reduction ratio: 2.2

Control System

Standard Materials:
Accessories: Bronze, Brass, Stainless Steel & NBR
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel

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	PD	Y	C	16	EB	–	CB	VI

Sector: WW — Waterworks

Size: 1¼" - 32"

Primary Feature: 720 — Proportional Pressure Reducing

Additional Feature: PD
- Automatic Regulation Override — 09
- Solenoid Controlled — 55
- Electric Override — 59
- Proportional Standard Ratio — PD
- Proportional Optional Ratio — PD2

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
- Epoxy FB Blue — EB
- Polyester Green — PG
- Polyester Blue — PB
- 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 additional electric control feature is selected

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

Additonal Attributes: VI
- Valve Position Indicator — I
- V-Port Throttling Plug — V
- Electric Limit Switch — S
- 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 Sustaining and Reducing Valve

- Protecting lower pressure zones
- Prioritizing higher pressure zones
- Preventing pipeline emptying
- Ensuring controlled pipeline fill-up
- Pump overload & cavitation protection
- Compensating during groundwater drawdown

The Model 723 Pressure Sustaining and Reducing Valve is a hydraulically operated, diaphragm actuated control valve with two independent functions. It sustains minimum pre-set upstream pressure regardless of fluctuating flow or varying downstream pressure, and it prevents downstream pressure from rising above maximum pre-set regardless of fluctuating flow or excessive 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
- **Stainless Steel raised seat** – Cavitation damage resistant
- **Obstacle free, full bore** – Uncompromising reliability
- **V-Port Throttling Plug** – Low flow stability

Major Additional Features

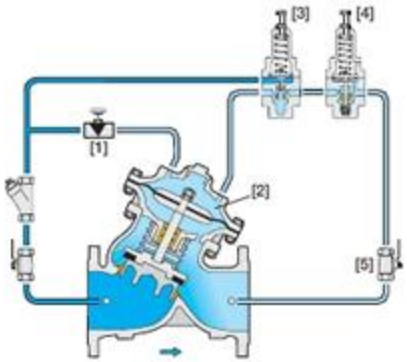
- Solenoid control – **723-55**
- Check feature – **723-20**
- High sensitivity pilots – **723-12**
- Solenoid control & check feature – **723-25**
- Downstream over pressure guard – **723-48**
- Proportional – **723-PD**

See relevant BERMAD publications.

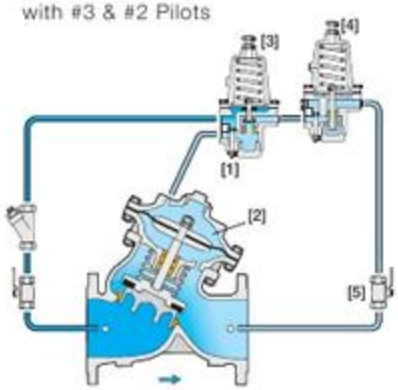
Operation

The Model 723 is a pilot controlled valve equipped with two adjustable, 2-Way pilots, pressure sustaining (PS) and pressure reducing (PR), operating independently in series.
The needle valve **[1]** continuously allows flow from the valve inlet into the upper control-chamber **[2]**.
The PS pilot **[3]** and the PR pilot **[4]** together control outflow from the upper control chamber.
Should upstream pressure fall below PS pilot setting, the pilot closes causing pressure to accumulate in the upper control chamber. The main valve throttles closed sustaining upstream pressure at the pilot setting.
Should upstream pressure rise above PS pilot setting, the pilot releases accumulated pressure from the upper control chamber to the main valve outlet through the held open PR pilot, opening the main valve.
Should opening the main valve cause downstream pressure to rise above PR pilot setting, the pilot closes, causing the main valve to throttle closed reducing downstream pressure to PR pilot setting.
The needle valve controls the closing speed. The downstream cock valve **[5]** enables manual closing.

1¼-4"
with #3PB & #2PB Pilots



6-14"
with #3 & #2 Pilots



Note: For 10" and larger valves, see "Pilot Valve Selection" table at the last page.

Engineer Specifications

The Pressure Sustaining and Reducing Valve shall sustain minimum pre-set upstream pressure regardless of fluctuating flow or varying downstream pressure, and shall also prevent downstream pressure from rising above maximum pre-set regardless of fluctuating flow or excessive 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.

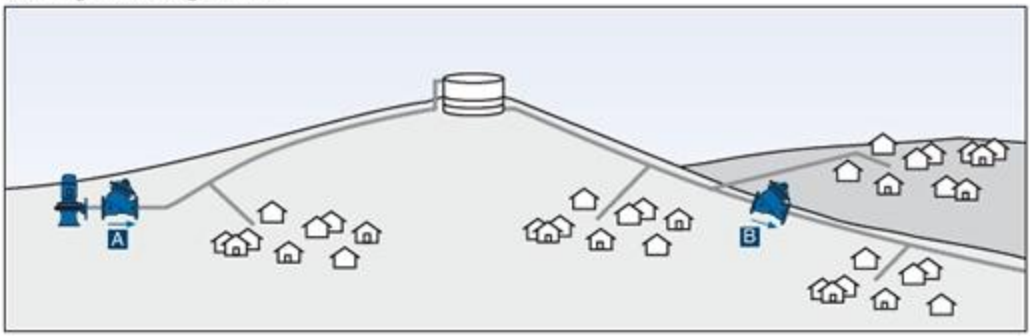
Actuator: The actuator assembly shall be double chambered with an inherent separating partition between the lower surface of the diaphragm and the main valve. The entire actuator assembly (seal disk to top cover) shall be removable from the valve as an integral unit. The stainless steel valve shaft shall 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 two 2-way adjustable, direct acting pilots (pressure sustaining and pressure reducing), 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 main valve shall be certified as a complete drinking water valve according to NSF, WRAS, and other recognized standards.

Typical Applications

Water is pumped from a deep well to the reservoir through a line also supplying nearby consumers along the way. Water is then supplied from the reservoir to both higher and lower elevation consumers. Both parts of the system require pressure sustaining and reducing solutions.

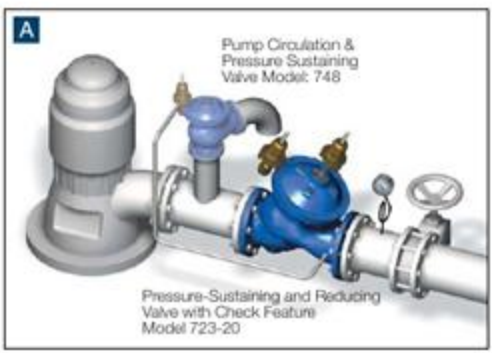


Groundwater Draw Down System

In deep well pumping systems, the groundwater level varies according to: seasonal changes, seepage rate, and demand. These systems require a solution to a unique combination of issues:

- Consumer demand or filling an empty line results in pump overload and cavitation, requiring pressure sustaining.
- Deep well pumps boost a constant ΔP, resulting in high ground level raising the discharge pressure, requiring pressure reducing.

The Model 723 provides a complete solution for both of these issues. Adding check feature "20", saves the cost of a line-sized check valve.

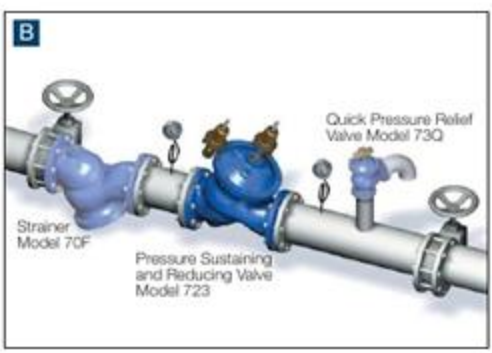


Gravity Fed Supply Line

Where consumers at both higher and lower elevations use the same distribution network:

- Consumers located at higher elevation need protection against over demand by the lower zone.
- Lower zone consumers need protection against high gravity fed pressure.

The Model 723, being both a pressure sustaining and reducing valve, simultaneously fulfills both requirements.

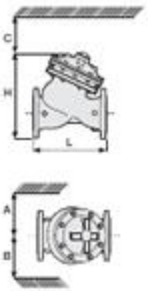


Technical Data

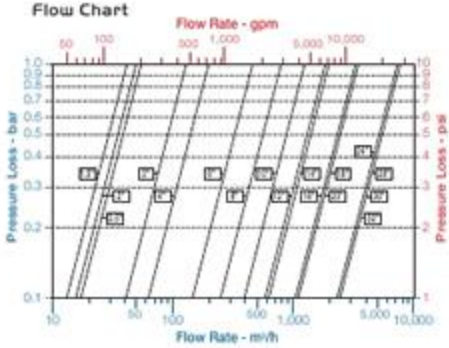
Dimensions and Weights

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	646	1860
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 disk 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 Nylon fabric-reinforced
Seals: NBR
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
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Pilot Standard Materials:
Body: Brass, Bronze or Stainless Steel
Elastomers: NBR
Springs: Galvanized Steel or Stainless Steel
Internals: Stainless Steel

Pilot Valve Selection

Valve Size	Pilot Setting (bar)	Pilot Type		
		#2PB #3PB	#2 #3	#2HC #3HC
1½-4" 40-100 mm	<15	■		
	>15		●	
6-14" 150-350 mm	<15		■	
	>15		●	
16 -32" 400-800 mm	<15			■
	>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"	723	00	Y	C	16	EB	–	CB	VI

Sector: Waterworks

Size: 1½ - 32"

Primary Feature: Pressure Sustaining and Reducing

Additional Feature (Multiple choices permitted)

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 Control	50
Solenoid Controlled	55
Electric Override	59

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

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

Voltage & Position (Use when additional electric control feature is selected)

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

Tubing & Fittings

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

Additonal Attributes (Multiple choices permitted)

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
Viton Elastomers for Seals & Diaphragm	E
Pressure Gauge	6

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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
- **Stainless Steel raised seat** – Cavitation damage resistant
- **Obstacle free, full bore** – Uncompromising reliability
- **V-Port Throttling Plug** – Low flow stability

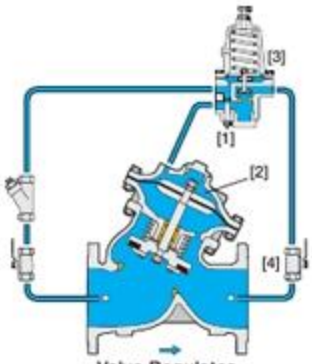
Major Additional Features

- UL Listed and 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**

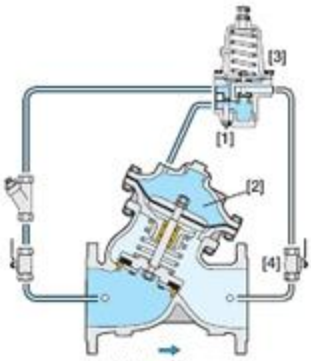
See relevant BERMAD publications.

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

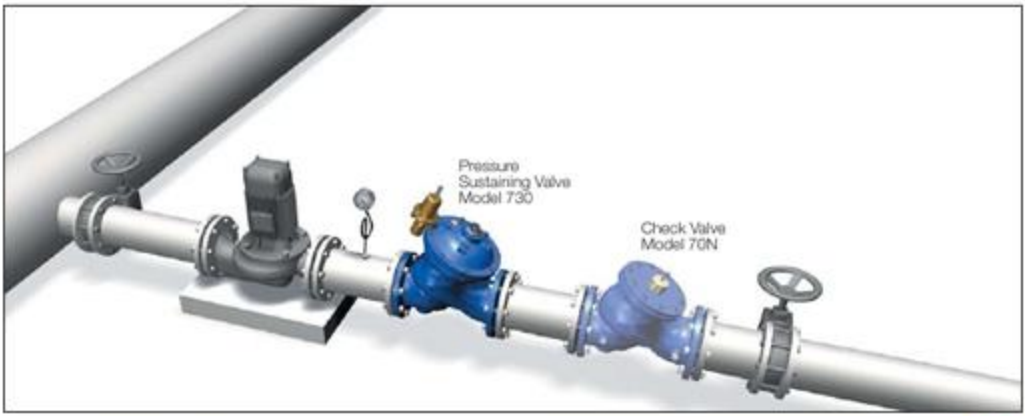


Valve Closed
(upstream pressure below pilot setting)

Typical Applications

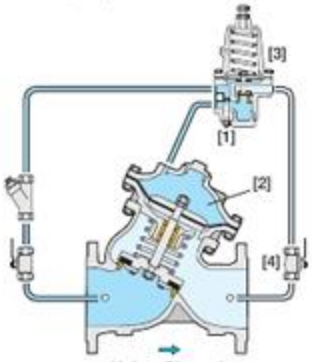
Pump Overload and Cavitation Protection

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.

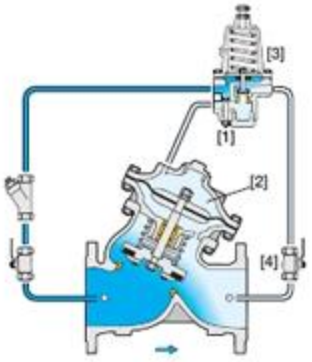


Operation - Pressure Relief (Circulation)

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)

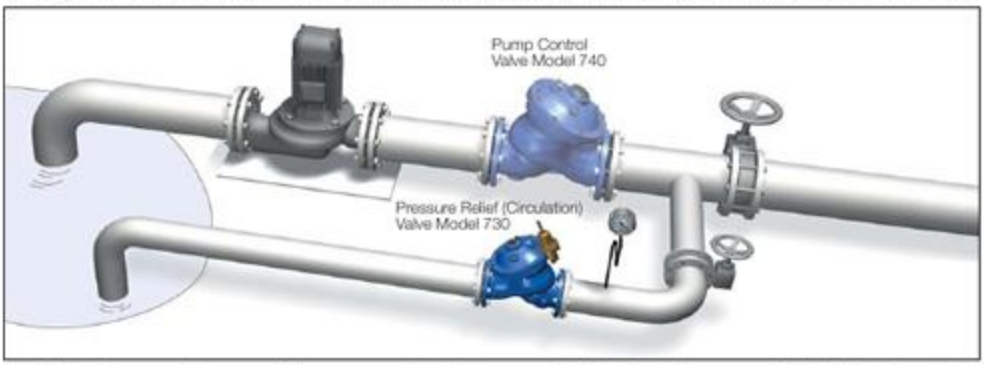


Valve Regulates

Typical Applications

Safeguarding Pump Minimum Flow

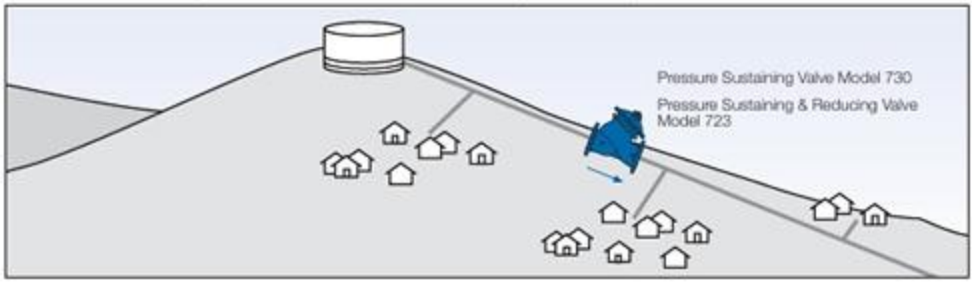
The Model 730 relieves over pressure caused by excessive pump discharge during low demand. To keep a constant discharge pressure, the difference between pumped flow and consumer demand can be circulated back to pump suction.



Circulation valves are often exposed to severe cavitation because valve ΔP and velocity are usually high while downstream pressure is very low. On the other hand, the valves operate under these conditions for relatively short periods. Increased valve durability for applications requiring 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.

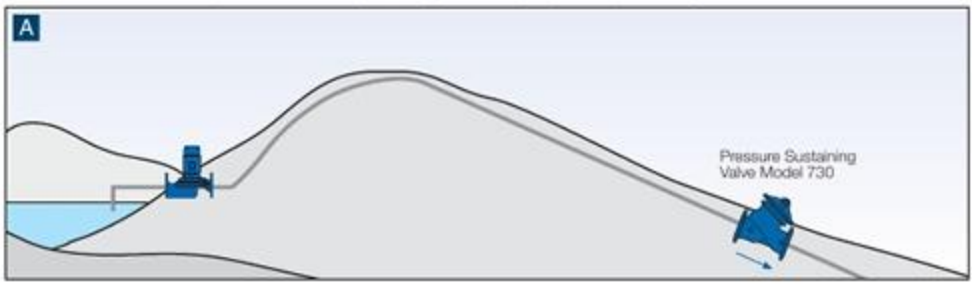
Prioritizing One Zone over Another

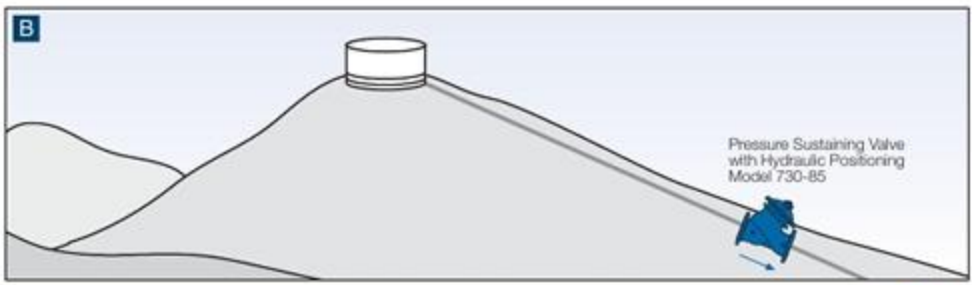
This application is usually found in gravity fed systems. The **Model 730** enables prioritizing the higher elevation zone over downhill consumers when they create excessive total demand.
By adding a pressure reducing feature to the primary pressure sustaining function, the Model 730 becomes a **Model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





Engineer 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.

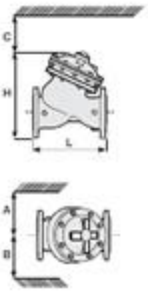
Quality Assurance: The valve manufacturer shall be certified according to the ISO 9001 Quality Assurance Standard. The main valve shall be certified as a complete drinking water valve according to NSF, WRAS, and other recognized standards.

Technical Data

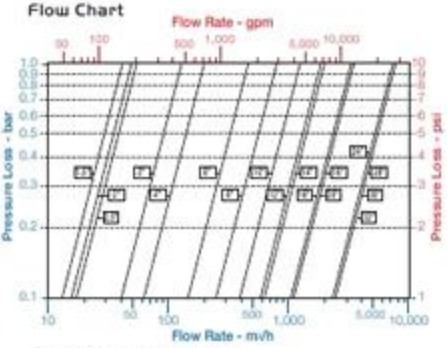
Dimensions and Weights

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	10.8	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	1660
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 disk valves
For more flow charts, refer to Engineering Section

Main Valve

Valve Patterns: "Y" (globe) & angle
Size Range: 1⅛"-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 Nylon fabric-reinforced
Seals: NBR
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
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Pilot Standard Materials:
Body: Brass, Bronze or Stainless Steel
Elastomers: NBR
Springs: Galvanized Steel or Stainless Steel
Internals: Stainless Steel

Pilot Valve Selection

Valve Size	Pilot Setting (bar)	Pilot Type		
		#3PB	#3	#3HC
1⅛"-4"	<15	■		
40-250 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

Sector: WW — Waterworks

Size: 1⅛" - 32"

Primary Feature: 730 — Pressure Relief/Sustaining

Additional Feature:

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 Control	50
Solenoid Controlled	55
Electric Override	59
High sensitivity hydraulic positioning	85

Multiple choices permitted

Pattern:

Oblique Angle (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:

Epoxy FB Blue	EB
Polyester Green	PG
Polyester Blue	PB
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 additional electric control feature is selected

Tubing & Fittings:

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

Additonal Attributes:

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

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Pressure Relief/Sustaining Valve

with Solenoid Control

- Prioritizing pressure zones
- Pump overload & cavitation protection
- Backup for reservoir supply valves
- Safeguarding pump minimum flow
- Switching between pressure regimes

The Model 730-55 Pressure Relief/Sustaining Valve with Solenoid Control is a hydraulically operated, diaphragm actuated control valve that sustains minimum pre-set, upstream (back) pressure regardless of fluctuating flow or varying downstream pressure. It also either opens or closes in response to an electric signal. When installed as a circulation valve, the Model 730-55 relieves excessive line pressure when above maximum pre-set.

Features and Benefits

- **Line pressure driven** – Independent operation
- **Solenoid controlled**
  - Low power consumption
  - Wide ranges of pressures and voltages
  - Normally Open, Normally Closed, or Last Position
- **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
- **Stainless Steel raised seat** – Cavitation damage resistant
- **Obstacle free, full bore** – Uncompromising reliability
- **V-Port Throttling Plug** – Low flow stability

Major Additional Features

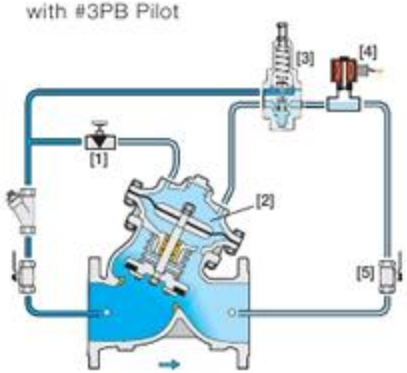
- Pressure sustaining and reducing with solenoid control – **723-55**
- Electrically selected multi-level settings – **730-45**
- High sensitivity pilot – **730-55-12**
- Electric override for fire protection – **FP-730-59**
- Level-control & pressure sustaining with bi-level electric float – **753-65**
- Pump circulation & pressure sustaining valve – **748**
- Electronic pressure sustaining valve – **738-03**

See relevant BERMAD publications.

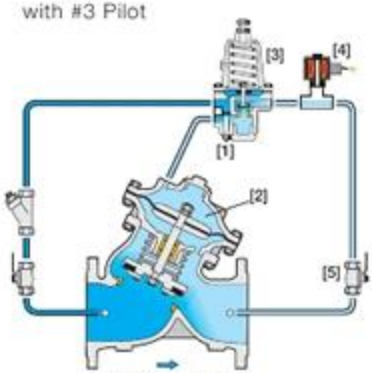
Operation

The Model 730-55 is a pilot controlled valve equipped with an adjustable, 2-Way, pressure sustaining pilot and a solenoid 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 the solenoid **[4]** together control outflow from the upper control chamber.
Should this pressure fall below pilot setting, the pilot closes, enabling pressure to accumulate in the upper control chamber, and causing the main valve to throttle thereby sustaining upstream pressure at pilot setting.
Should upstream pressure rise above pilot setting, the pilot releases accumulated pressure and the main valve modulates open.
Should the solenoid pilot close, pressure in the upper control-chamber accumulates causing the main valve to shut off.
The needle valve controls the closing speed. The downstream cock valve **[5]** enables manual closing.
Normally closed, normally open and last position models are available.

1¼-4"
with #3PB Pilot



6-14"
with #3 Pilot



Note: For 16" and larger valves, see "Pilot Valve Selection" table at the last page of Model 730.

Engineer Specifications

The Pressure Relief/Sustaining Valve with Solenoid Control shall sustain minimum pre-set, upstream pressure regardless of fluctuating flow or varying downstream pressure; and it shall either open or close in response to an electric signal.
When installed as a circulation valve, the Model 730-55 relieves 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, a filter, and a 2-Way solenoid pilot. All fittings shall be forged brass or stainless steel. The assembled valve shall be hydraulically tested and factory adjusted to customer requirements.

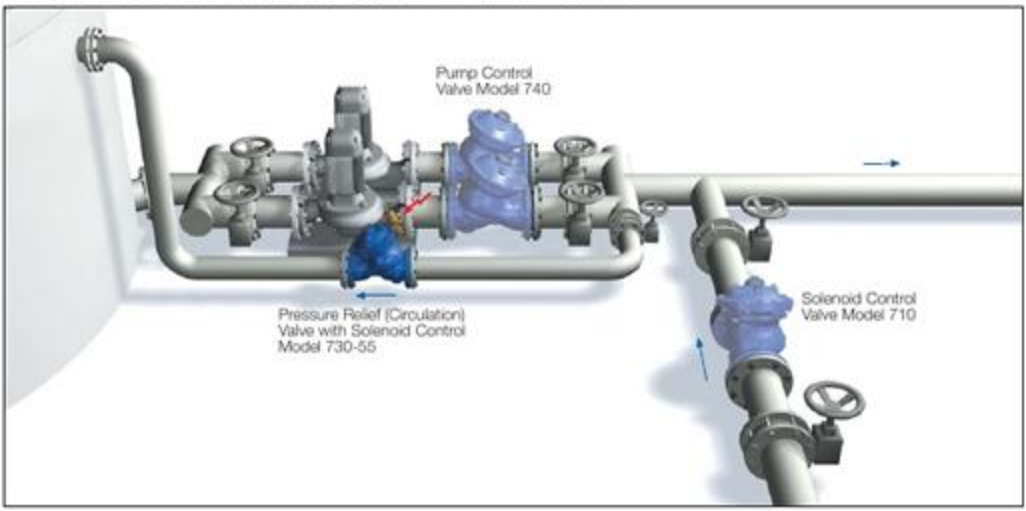
Quality Assurance: The valve manufacturer shall be certified according to the ISO 9001 Quality Assurance Standard. The main valve shall be certified as a complete drinking water valve according to NSF, WRAS, and other recognized standards.

Typical Applications

Circulating Valve with Reservoir Overflow Protection

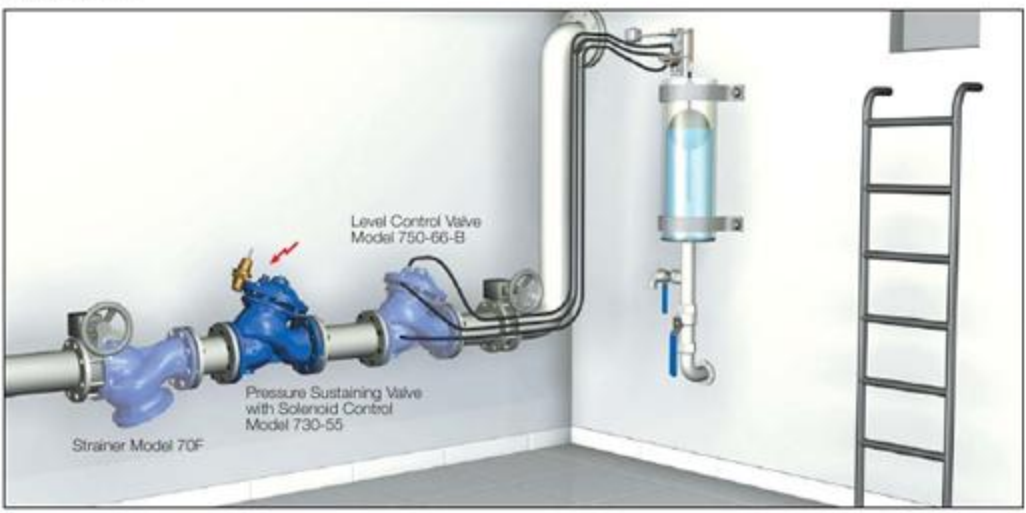
Water is supplied to the consumer network from the reservoir or directly from the major supply network:

- During pumping from the reservoir, the Normaly Closed Model 730-55, with energized solenoid, serves as a circulation valve.
- During direct supply, pressure might be higher than pilot setting, possibly causing reservoir overflow. The de-energized solenoid keeps the Model 730-55 closed, preventing reservoir filling from this source.



Reservoir Level Control Backup

To sustain minimum network pressure, the Normaly Open Model 730-55 prioritizes consumers before supply to the reservoir. In addition, this valve provides electric control backup protection (solenoid & float switch) should the hydraulic level control fail.



BERMAD Waterworks

700 Series

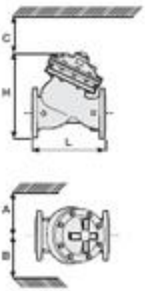
Model 730-55

Technical Data

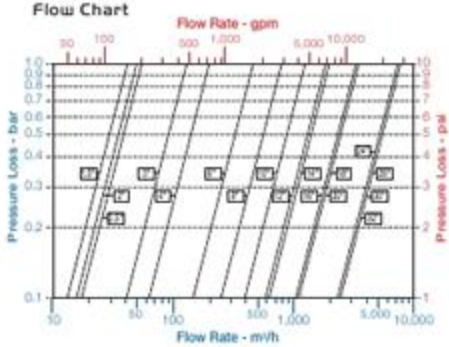
Dimensions and Weights

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	726	28.5	840	33.1	370	816
350	14"	545	22	685	27	733	28.9	868	34.1	381	840
400	16"	645	26	965	38	990	39.0	1106	43.6	848	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 disk 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 Nylon fabric-reinforced
Seals: NBR
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
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Pilot Standard Materials:
Body: Brass, Bronze or Stainless Steel
Elastomers: NBR
Springs: Galvanized Steel or Stainless Steel
Internals: Stainless Steel

Pilot Valve Selection

Valve Size	Pilot Setting (bar)	Pilot Type		
		#3PB	#3	#3HC
1½-4" 40-250 mm	≤15	■		
	>15		●	
6-14" 150-350 mm	≤15		■	
	>15		●	
16 -32" 400-800 mm	≤15			■
	>15			●

■ Standard model ● with high pressure setting kit

Solenoid Standard Materials:

Body: Brass or Stainless Steel
Elastomers: NBR or FPM
Enclosure: Molded epoxy
Solenoid Electrical Data:
Voltages:
(ac): 24, 110-120, 220-240, (50-60 Hz)
(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.

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	55	Y	C	16	EB	4AC	CB	I

Sector	
Waterworks	

Size	
1½ - 32"	

Primary Feature	
Pressure Relief/Sustaining	

Additional Feature	
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 Control	50
Solenoid Controlled	55
Electric Override	59

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	
Epoxy FB Blue	EB
Polyester Green	PG
Polyester Blue	PB
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

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

Additonal Attributes	
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
Viton Elastomers for Seals & Diaphragm	E
Pressure Gauge	6

Multiple choices permitted

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Surge Anticipating Control Valve

with Solenoid Control

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

The Model 735-55-M Surge Anticipating Valve with Solenoid Control is an off-line, hydraulically operated, diaphragm actuated valve. The valve immediately opens in direct response to any power failure even prior to the pressure drop associated with abrupt pump stoppage. The pre-opened valve dissipates the returning high pressure wave, eliminating the surge.
The Model 735-55-M, sensing line pressure, 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 and maintenance costs
  - Especially economic for higher pressure ratings
- **Solenoid controlled**
  - Low cost wiring
  - Wide range of pressures
- **Line pressure driven**
  - No motor required
  - 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

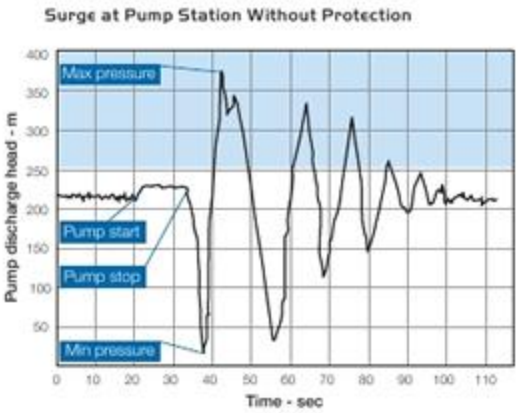
Major Additional Features

- Sensing diaphragm (for sewage) – **735-55-Md**
- Hydraulic Override – **735-55-09-M**
- Electric override for fire protection – **FP-730-59**
- Electrically selected multi-level settings – **735-45-M**
- Quick pressure relief valve – **73Q**

See relevant BERMAD publications.

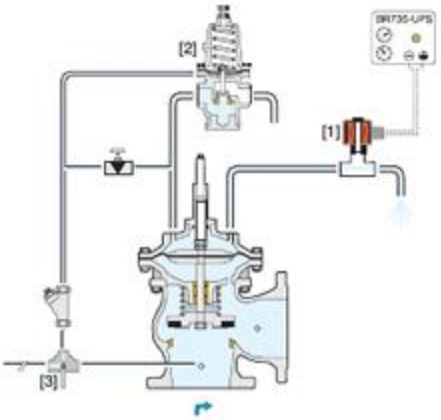
Operation

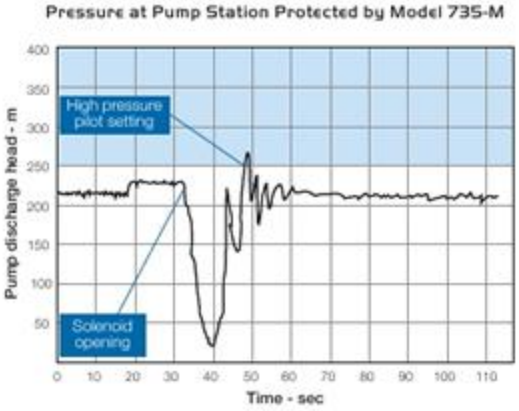
The abrupt stopping of a pump produces a pressure drop as the traveling column of water, with its inherent momentum, continues to travel along the line, generating severe low pressure.
When the traveling column of water loses its momentum, it travels back towards the pump. Should it hit the closed check 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.



Eliminating surge requires anticipation and pre-action. The Model 735-55-M is well suited to this task.
The N.C. solenoid **[1]** is energized by the UPS Controller immediately upon power failure, which allows the remaining line pressure to quickly open the main valve prior to the anticipated pressure drop.
The already opened Model 735-55-M releases the returning column of water, minimizing the line pressure rise. Should the relief rate be insufficient and the pressure exceed the High Pressure (HP) pilot **[2]** setting, the pilot immediately opens, further opening the main valve.
After a pre-set delay, the UPS Controller de-energizes the solenoid, closing it. As system pressure stabilizes again at static pressure, the HP pilot closes 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 **[3]** serves for selecting operating and sensing source:

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





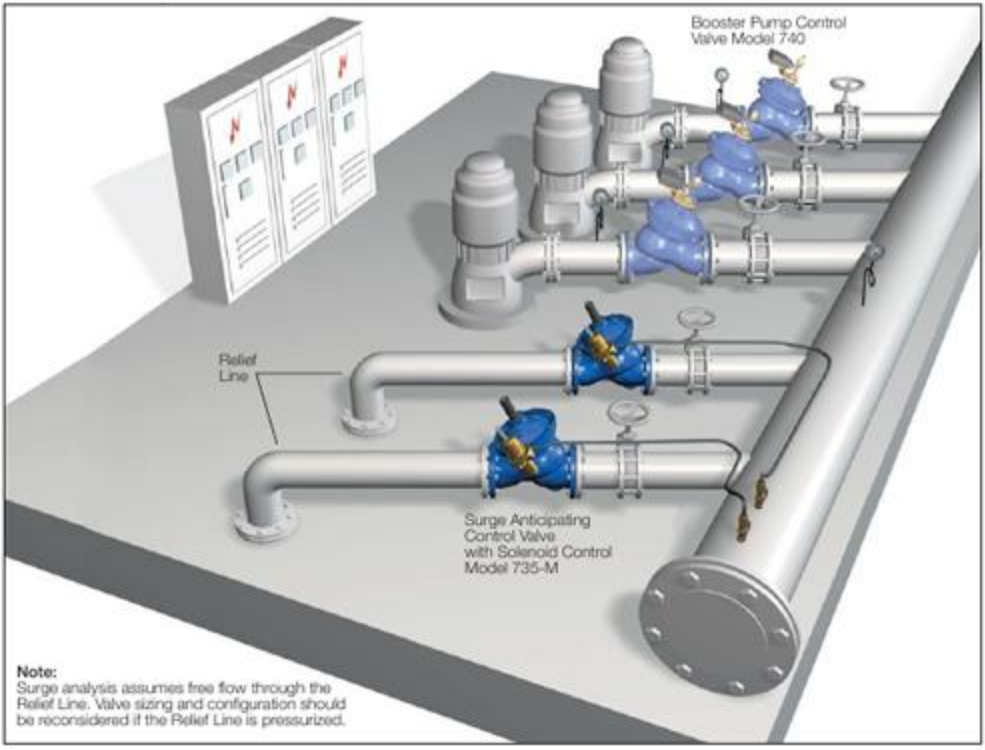
Typical Applications

In this system, a pump battery supplies the main line through a manifold. The Model 735-55-M:

- Eliminates surge upon power failure
- Provides surge free switching between "on-duty" pumps
- Closes smoothly according to pilot setting

The solenoid control is especially advantageous when:

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



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 **U**n-Interruptible **P**ower **S**ource **(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 pre-set time after which it de-energizes the solenoid, allowing the Model 735-55-M to start closing.

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 and computer software, BERMAD's experienced engineers can perform the desired analysis.
For best analysis, all of the following data is required.

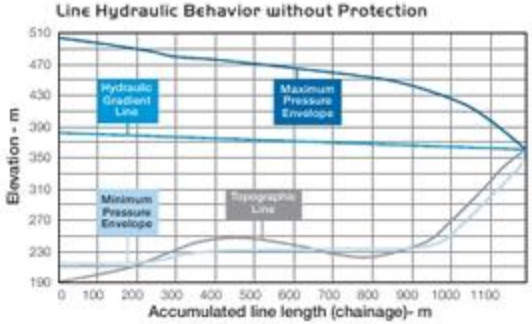
- Main Line
  - Line Profile (Chainage), elevations at accumulated length
  - Internal diameter
  - Length
  - Material
  - Wall thickness
- Pumps
  - Pump curve(s)
  - Max. number of pumps in simultaneous operation
  - Type of non-return valve
- System
  - Max. designed flow rate
  - Max. & min. levels 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 ~32 bar (see max. pressure envelope line)
- Vacuum conditions (see min. pressure envelope line)

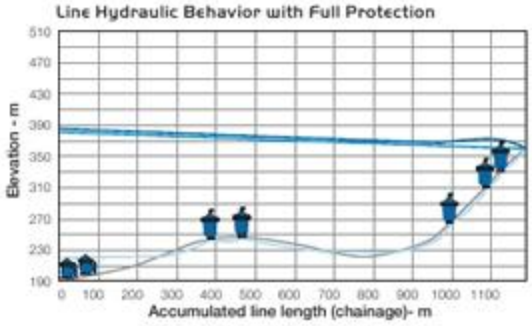


Simulated surge protection recommends:

- Two Model 735-55-M Valves installed in parallel at the pumping station
- Five Non-Slam Air Valves installed along the line

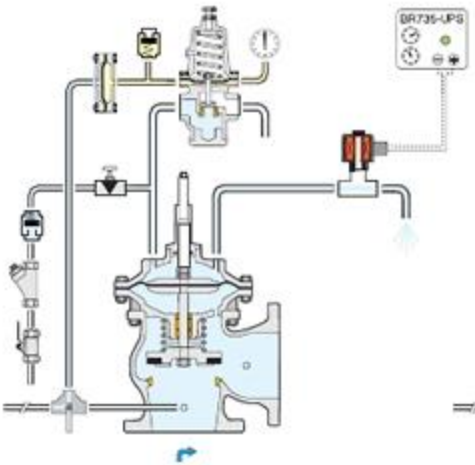
With full surge protection, the simulation shows no surge and minimal vacuum.

- Pressure at max. of ~19 bar (see max. pressure envelope line)
- No appreciable vacuum (see min. pressure envelope line)

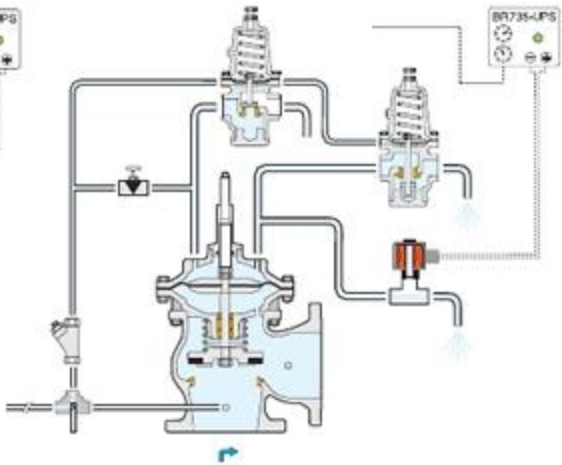


Any pipeline design requires air valves to admit air under vacuum conditions and to release air under pressure. The size, type and location of these air valves should consider surge protection requirements.

Additional Applications



Surge Anticipating Valve with Sensing Diaphragm
Model 735-55-Md
for Sewage Water



Surge Anticipating Valve with Hydraulic Override
Model 735-55-09-M
for Opening BackUp

Engineer Specifications

The Surge Anticipating Valve shall open in direct response to any power failure even prior to the pressure drop associated with abrupt pump stoppage. The pre-opened valve shall 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 a 2-Way adjustable pilot, a 2-Way Normally Closed DC solenoid, 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 main valve shall be certified as a complete drinking water valve according to NSF, WRAS, and other recognized standards.

BERMAD Waterworks

700 Series

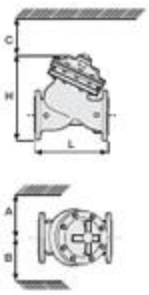
Model 735-55-M

Technical Data

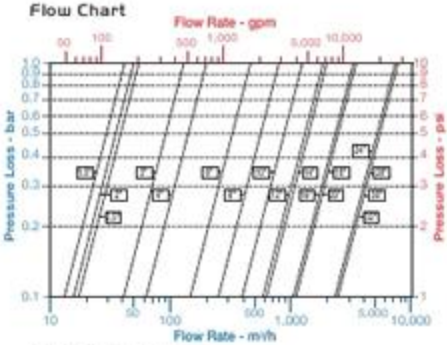
Dimensions and Weights

Size		A, B		C		L		H		Weight	
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	kg	lbs
40	1 ½"	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	2 ½"	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"	640	26	965	38	990	39.0	1108	43.6	646	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 disk 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 Nylon fabric-reinforced
Seals: NBR
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
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Pilot Standard Materials:
Body: Brass, Bronze or Stainless Steel
Elastomers: NBR
Springs: Galvanized Steel or Stainless Steel
Internals: Stainless Steel
Solenoid Standard Materials:
Body: Brass or Stainless Steel
Elastomers: NBR or FPM
Enclosure: Molded epoxy
Solenoid Electrical Data:
Voltages:
(dc): 24
Power Consumption:
(dc): 8-11.6W
Values might vary according to specific solenoid model

Pilot Valve Selection

Valve Size	Pilot Setting (bar)	Pilot Type		
		#3	#3HC	#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 Opening valve

BR 735-UPS Controller
Supply voltage: 110, 230 V(ac) 50/60 Hz
Self power consumption: 6VA
Batteries: Two 12V, 4AH, rechargeable type
Protection class: IP54
Operating temperature: 10-50°C (50-125°F)
Dimensions (mm): H-211, W-240 & D-116
System is capable of energizing up to two 24V(dc) 12W solenoids

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	55	Y	C	16	EB	4DC	CB	FM

Sector
- WW — Waterworks

Size
- 6" — 1½ - 32"

Primary Feature
- 735 — Surge Anticipating Control

Additional Feature
- 00 — No Additional Feature
- 09 — Hydraulic Override
- 45 — Multi-Setting Levels - Electrically Selected
- 55 — Solenoid Controlled
- 59 — Electric Override

Multiple choices permitted

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

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

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

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

Voltage & Position
- 4DC — 24VDC - N.C.

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

Additonal Attributes
- M — Flow Stem
- F — Large Control Filter
- d — Sensing Diaphragm
- V — V-Port Throttling Plug
- U — Orifice Assembly
- N — St. St. 316 Control Accessories
- T — St. St. 316 Internal Trim (Closure & Seat)
- D — St. St. 316 Actuator Internal Assembly
- R — Delrin Bearing
- E — Viton Elastomers for Seals & Diaphragm
- 6 — Pressure Gauge

Multiple choices permitted

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Surge Anticipating Control Valve

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

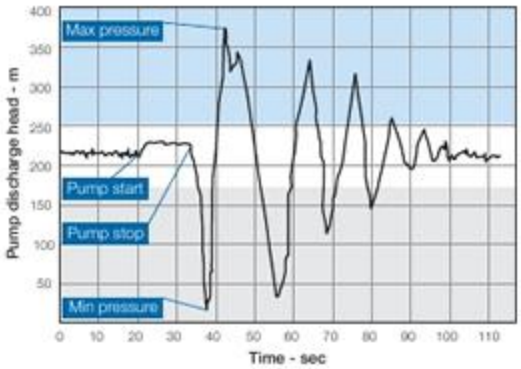
- Solenoid control – **735-55-M**
- Sensing diaphragm (for sewage) – **735-Md**
- Electric override for fire protection – **FP-730-59**
- Quick pressure relief valve – **73Q**

See relevant BERMAD publications.

Operation

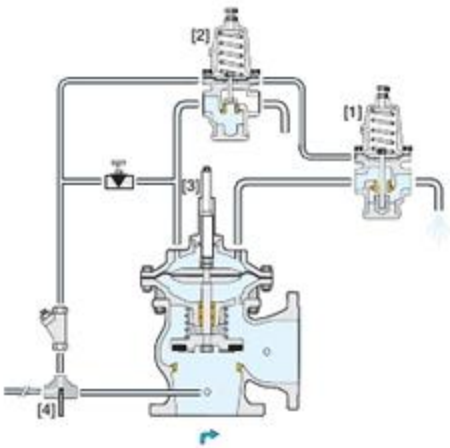
The abrupt stopping of a pump produces a pressure drop as the traveling column of water, with its inherent momentum, continues to travel along the line, generating severe low pressure.
When the traveling column of water loses its momentum, it travels back towards the pump. Should it hit the closed check 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

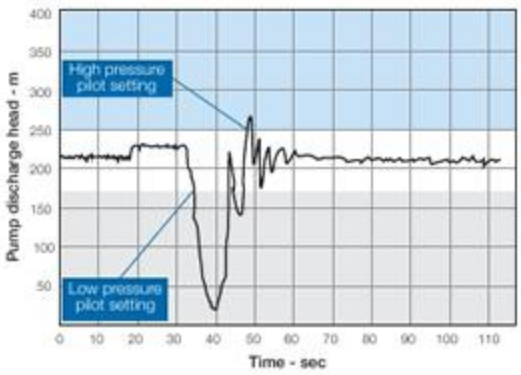


Eliminating surge requires anticipation and pre-action. The Model 735-M is well suited to this task.
The Low Pressure (LP) pilot **[1]** senses the initial pressure drop and opens. This immediate reaction allows remaining line pressure to quickly open the main valve.
The already opened Model 735-M releases the returning column of water, minimizing the line pressure rise. Should the relief rate be insufficient, and the pressure exceed 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 sensing source:

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



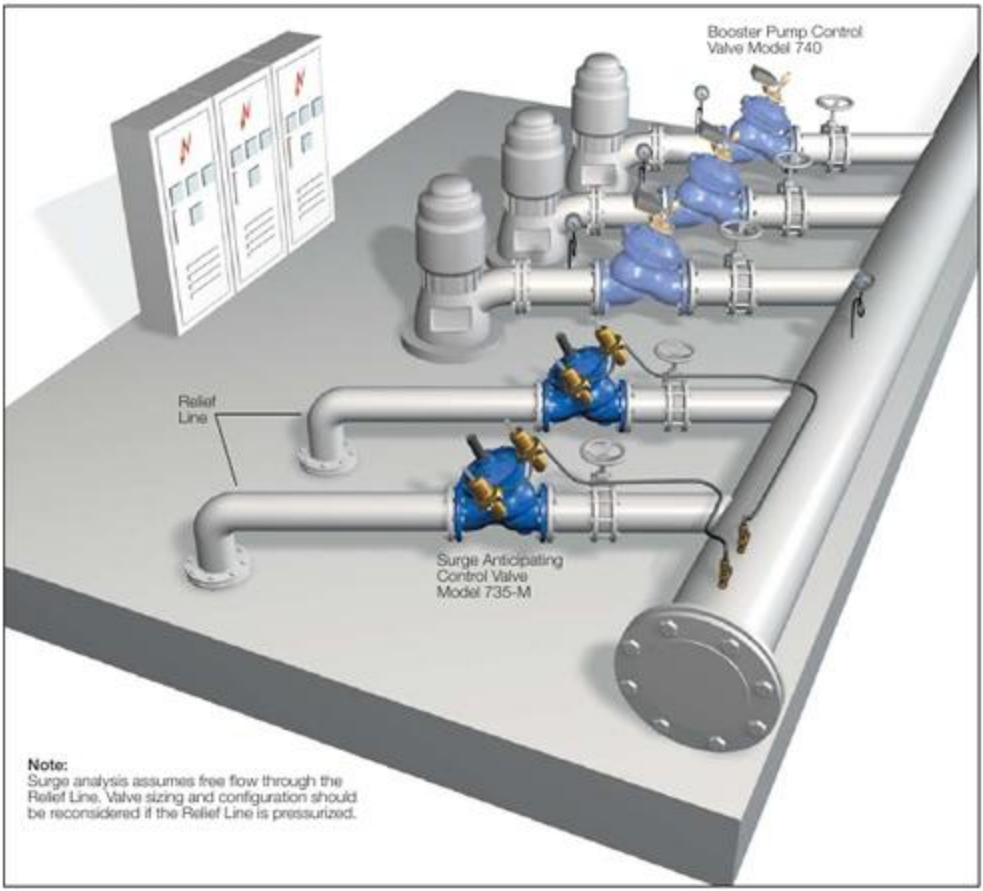
Pressure at Pump Station Protected by Model 735-M



Typical Applications

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

- Eliminates surge upon power failure
- Provides surge free switching between "on-duty" pumps
- Closes smoothly 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 and computer software, BERMAD's experienced engineers can perform the desired analysis.
For best analysis, all of the 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

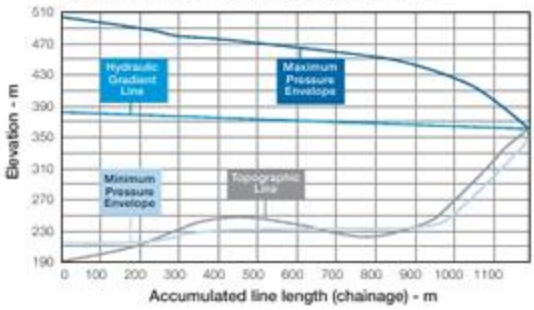
For systems with multiple pumping stations and/or multiple consumers along the supply line, the following data is also required:

- 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 ~32 bar (see max. pressure envelope line)
- Vacuum conditions (see min. pressure envelope line)

Line Hydraulic Behavior without Protection



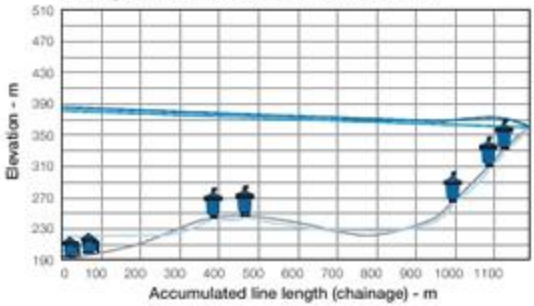
Simulated surge protection recommends:

- 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 ~19 bar (see max. pressure envelope line)
- No appreciable vacuum (see min. pressure envelope line)

Line Hydraulic Behavior with Full Protection



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

Additional Application

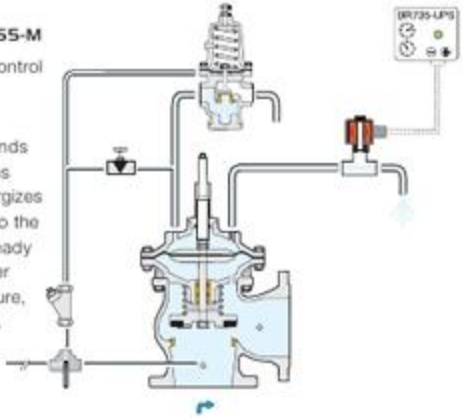
Surge Anticipating Valve with Solenoid Control Model 735-55-M

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 immediately 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 column 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 **U**n-Interruptible **P**ower **S**ource **(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.

Engineer 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 main valve shall be certified as a complete drinking water valve according to NSF, WRAS, and other recognized standards.

700 Series

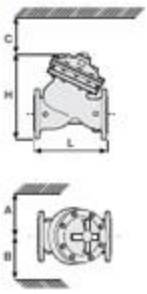
Model 735-M

Technical Data

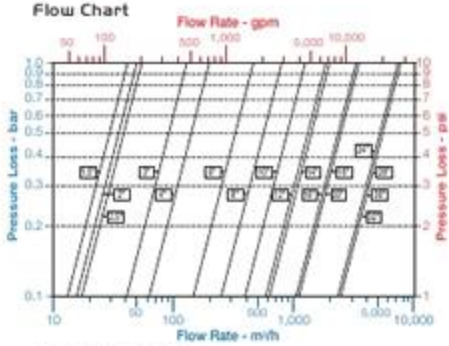
Dimensions and Weights

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
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	479
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	646	1865
450	18"	645	26	965	38	1000	39.4	1127	44.4	945	2082
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 disk 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 Nylon fabric-reinforced
Seals: NBR
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
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Pilot Standard Materials:
Body: Brass, Bronze or Stainless Steel
Elastomers: NBR
Springs: Galvanized Steel or Stainless Steel
Internals: Stainless Steel

Pilot Valve Selection

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

■ Standard model ● with high pressure setting kit
Ac-Accelerated Opening 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
- 1½ - 32"

Primary Feature
- 735 — Surge Anticipating Control

Additional Feature
- 00 — No Additional Feature
- 55 — Solenoid Controlled

Multiple choices permitted

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

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

End Connections
- 16 — ISO-16
- 25 — ISO-25
- A5 — ANSI-150
- A3 — ANSI-300
- J6 — JIS-16
- J2 — JIS-20
- EB — Epoxy FB Blue
- PG — Polyester Green
- PB — Polyester Blue
- UC — Uncoated
- 4AC — 24VAC/50Hz - N.C.
- 4AO — 24VAC/50Hz - N.O.
- 4DC — 24VDC - N.C.
- 4DO — 24VDC - N.O.
- 4DP — 24VDC - L.P.
- 2AC — 220VAC/50-60Hz N.C.
- 2AO — 220VAC/50-60Hz N.O.

Use when additional electric control feature is selected

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

Voltage & Position
- – — 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

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

Additonal Attributes
- FM

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Differential Pressure Sustaining Valve

- Pump overload & cavitation protection
- Balancing between circuits in HVAC systems
- Safeguarding pump minimum flow
- Emergency filter by-pass

The Model 736 Differential Pressure Sustaining Valve is a hydraulically operated, diaphragm actuated control valve that sustains minimum pre-set, differential pressure between two points regardless of fluctuating flow or varying upstream pressure.

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
- **Stainless Steel raised seat** – Cavitation damage resistant
- **Obstacle free, full bore** – Uncompromising reliability
- **V-Port Throttling Plug** – Low flow stability

Major Additional Features

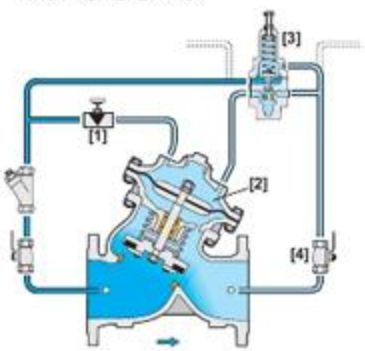
- Solenoid control – **736-55**
- Check feature – **736-20**
- High sensitivity pilot – **736-12**
- Solenoid control & check feature – **736-25**
- Electric override – **736-59**
- Electronic Differential Pressure Sustaining valve – **738-03-06**

See relevant BERMAD publications.

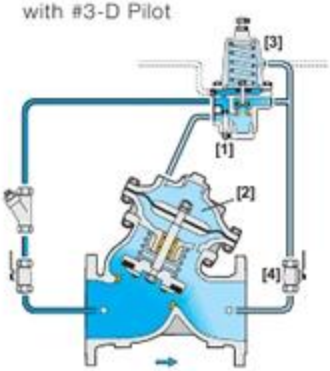
Operation

The Model 736 is a pilot controlled valve equipped with an adjustable, 2-Way differential pressure sustaining pilot.
The needle valve continuously allows flow from valve inlet into the upper control chamber **[2]**. The pilot **[3]**, locally or remotely, senses both high pressure below its diaphragm and low pressure above it.
Should differential pressure fall below pilot setting, the pilot throttles, enabling pressure to accumulate in the upper control chamber, causing the main valve to throttle, thereby sustaining differential pressure at the pilot setting.
Should differential pressure 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.
Pressure sensing is either internal (standard) or external (on request)

1¼- 4"
with #3PB-D Pilot



6-14"
with #3-D Pilot



Note: For 16" and larger valves, see "Pilot Valve Selection" table at the last page.

Engineer Specifications

The Differential Pressure Sustaining Valve shall sustain minimum pre-set, differential pressure between two points regardless of fluctuating flow 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.

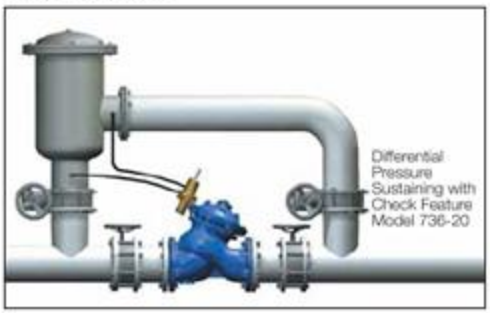
Actuator: The actuator assembly shall be double chambered with an inherent separating partition between the lower surface of the diaphragm and the main valve. The entire actuator assembly (seal disk to top cover) shall be removable from the valve as an integral unit. The stainless steel valve shaft shall 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, differential 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 main valve shall be certified as a complete drinking water valve according to NSF, WRAS, and other recognized standards.

Typical Applications

Filtration Systems

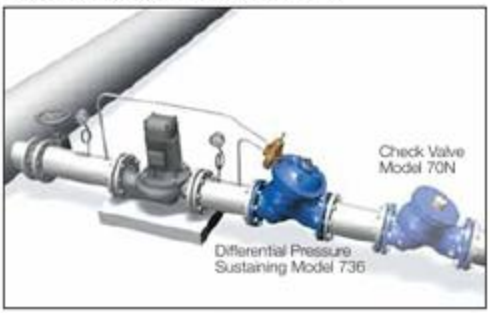


In filtration systems there are two cases when by-passing the filter is essential:

- Blocked filter (potentially causing element collapse)
- Demand for emergency fire water

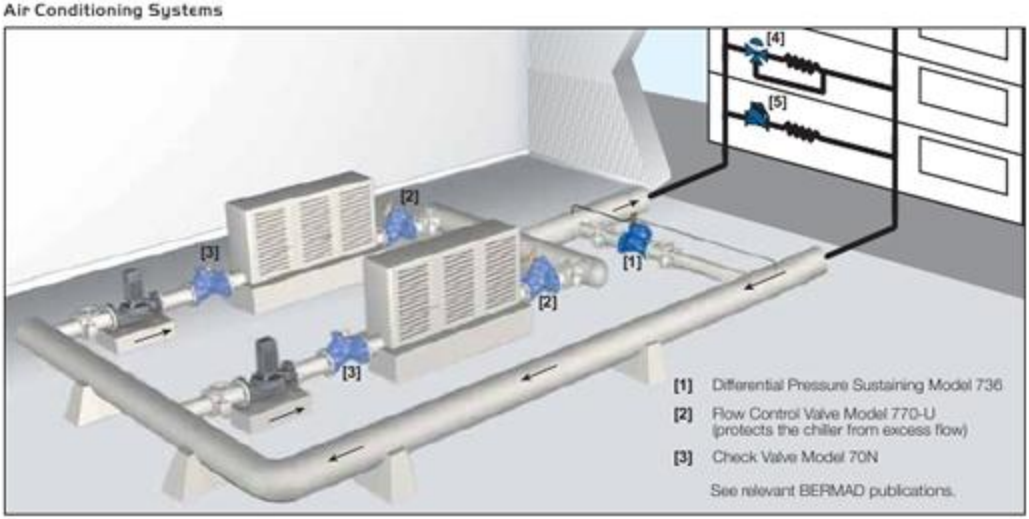
The Model 736, installed as a by-pass, progressively compensates for excessive demand.
Adding feature "S" incorporates alarm signaling attribute.

Pump Overload & Cavitation Protection



Where suction pressure regimes vary, the Model 736 is needed to limit pump flow by sustaining pump differential pressure, preventing pump overload and cavitation damage caused by excessive demand.
Adding check feature "20", saves the cost of a line sized check valve.

Air Conditioning Systems



Air conditioning chillers are sensitive to changes in flow.
In typical large scale air conditioning systems, two types of valves react to varying consumer demand:

- **Three-way valves [4]** route flow that is in excess of demand through a by-pass.
- **Two-way valves [5]** enable reduced flow or shut off completely.

Chillers in systems that include two-way valves might be subjected to varying flows.
The Model 736 **[1]** functions as a circulation valve to sustain preset differential pressure between distribution and collection lines:

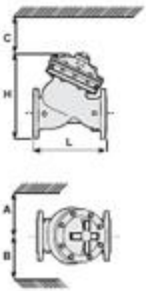
- Safeguarding system minimum flow protecting the chillers from low flow freezing
- Relieving excessive pressure

Technical Data

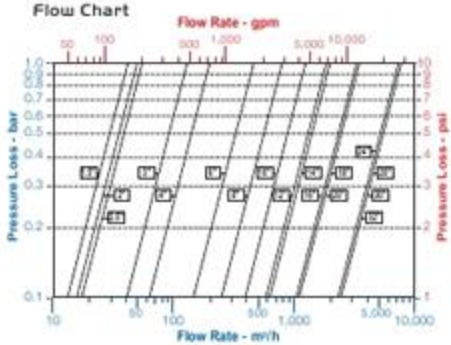
Dimensions and Weights

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	10.8	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	12.8	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 disk 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 Nylon fabric-reinforced
Seals: NBR
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
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Pilot Standard Materials:
Body: Brass, Bronze or Stainless Steel
Elastomers: NBR
Springs: Stainless Steel
Internals: Stainless Steel

Pilot Valve Selection

Valve Size	Pilot Setting (bar)	Pilot Type		
		#3PB-D	#3-D	#3HC-D
1½-4" 40-100 mm	<15	■		
	>15		●	
6-14" 150-350 mm	<15		■	
	>15		●	
16-32" 400-800 mm	<15			■
	>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"	736	00	Y	C	16	EB	–	CB	VI

Sector
- WW — Waterworks
  For Air-Condition applications order Sector "WC" - valve prepared for thermal insulation

Size
- 1½ - 32"

Primary Feature
- 736 — Differential Pressure Sustaining

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

Multiple choices permitted

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

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

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

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

Voltage & Position
- 4AC — 24VAC/50Hz - N.C.
- 4AO — 24VAC/50Hz - N.O.
- 4DC — 24VDC - N.C.
- 4DO — 24VDC - N.O.
- 4DP — 24VDC - L.P.
- 2AC — 220VAC/50-60Hz N.C.
- 2AO — 220VAC/50-60Hz N.O.

Use when additional electric control feature is selected

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

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

Multiple choices permitted

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Booster Pump Control Valve

Active Check Valve

- 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 740 Booster Pump Control Valve is a 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

- 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**

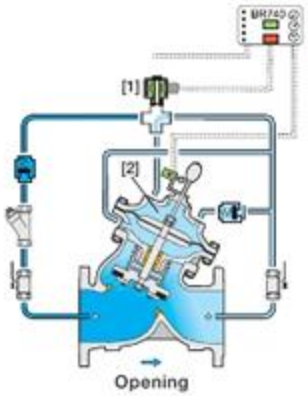
See relevant BERMAD publications.

Sequence of Operation (Normally-Open Type)

The Model 740 is a solenoid controlled valve equipped with a limit switch, a 3-Way solenoid pilot and check valves.
Normally Closed type is also available.
For large valves, an accelerator quickens valve response.

Pump Starting Procedure

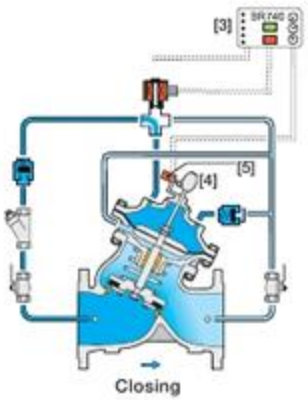
Prior to pump start, the valve is hydraulically closed although electrically open. The de-energized solenoid **[1]** connects the upper control chamber **[2]** to valve outlet introducing system static pressure.
As pump starts, valve upstream pressure builds and rises above the system static pressure, causing opening hydraulic forces to rise.
The upper control chamber pressure is released to valve outlet through the solenoid, allowing the valve to gradually open.



Opening

Pump Stopping Procedure

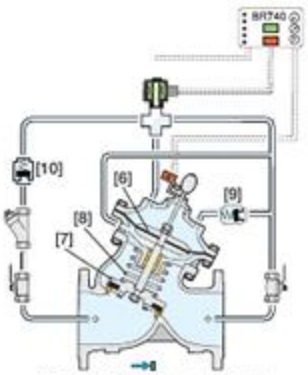
In pumping systems with standard check valves, the shut-down command is issued directly to the pump, abruptly shutting it down.
In systems with "active check valves", the shut-down command is issued to the BR740-E electronic controller **[3]** which energizes the solenoid. The solenoid then applies pumped pressure to the upper control chamber, gradually closing the main valve and isolating the runing 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.



Closing

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. Once the main valve has closed, the check valve **[9]** allows downstream pressure into the upper control chamber while the check valve **[10]** traps it, resetting the main valve for the next pump starting process.

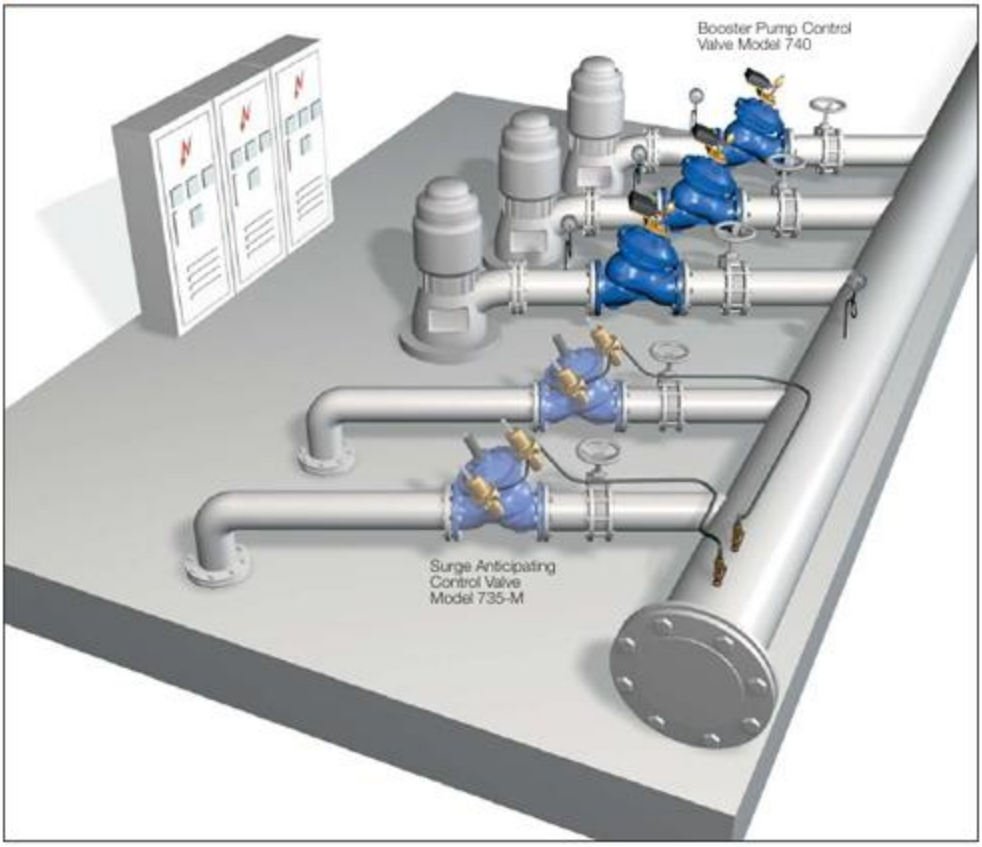


Closed (After Power Failure)

Typical Installation

In this system, a pump battery supplies the main line through a manifold.
The Model 740, 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.

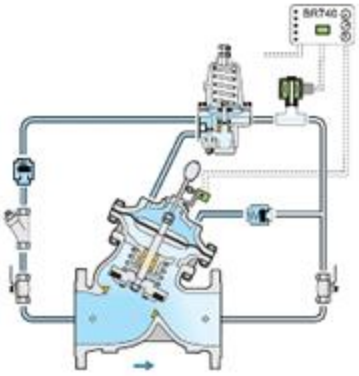
Additional Applications

Booster Pump Control & Pressure Sustaining Valve Model 743

Network demand is greater than pump design specifications:

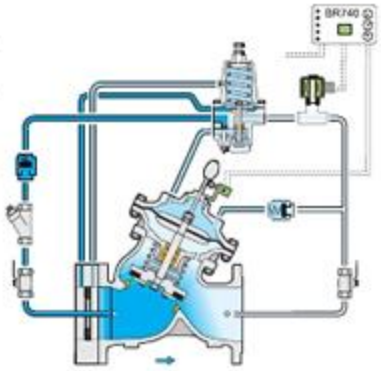
- During empty pipeline filling
- During over demand by consumers
- When the pump pressure specification is higher than system resistance

Any of these factors might cause pump overload and 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 740.



Booster Pump Control & Flow Control Valve Model 747-U

When network demand is greater than pump design specifications and the pump curve (Flow versus Pressure) is relatively steep, the Booster Pump Control & Pressure Sustaining Valve Model 743 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 747-U adds a flow limiting feature to the operation sequence of the standard Model 740.

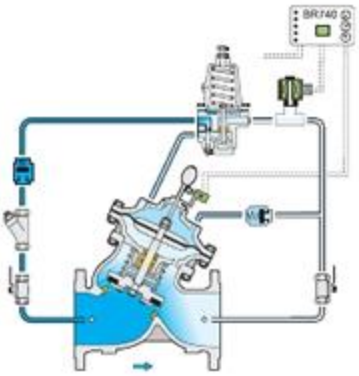


Booster Pump Control & Pressure Reducing Valve Model 742

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 tower with high level differential
- Deep well initial draw down

When the pump curve (Flow versus Pressure) is relatively steep, the Pressure Relief (Circulation) Model 730 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 742 adds a pressure reducing feature while maintaining the operation sequence of the standard Model 740.



Engineer Specifications

The Pump Control Valve shall open fully or shut off in response to electric signals. It shall isolate the pump from the system during pump starting and stopping to prevent pipeline surges.

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 3-Way solenoid pilot (for 8" and larger valves, an accelerator shall be added to the solenoid), two check valves (for 12" and larger valves, an additional check valve), a limit switch, two isolating cock valves, 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 main valve shall be certified as a complete drinking water valve according to NSF, WRAS, and other recognized standards.

700 Series

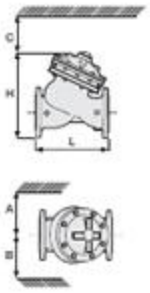
Model 740

Technical Data

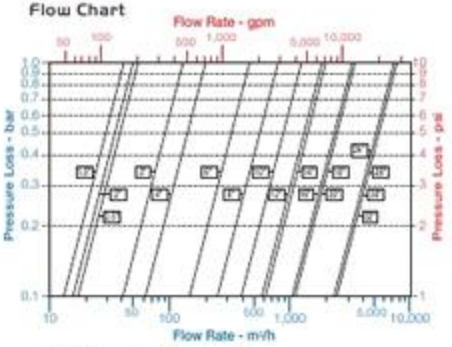
Dimensions and Weights

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	1866
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 disk 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 Nylon fabric-reinforced
Seals: NBR
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
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Solenoid Standard Materials:
Body: Brass or Stainless Steel
Elastomers: NBR or FPM
Enclosure: Molded epoxy
Solenoid Electrical Data:
Voltages:
(ac): 24, 110-120, 220-240, (50-60 Hz)
(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

Accelerator Standard Materials:
Body: Brass or Stainless Steel
Internals: Stainless Steel & Brass
Elastomers: NBR or FPM

Solenoid Selection

Valve Size	Solenoid Model		Accelerator Model	
	330 (2.0 mm)	311 (1.0 mm)	54	58HC
1½-8"	■			
1½-6"		■		
10-20"	■		■	
8-20"		■	■	
24 -32"	■			■
24 -32"		■		■
	PN 16		PN 25	

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

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"	740	00	Y	C	16	EB	4AO	CB	S
Waterworks	1½ - 32"	Booster Pump Control								

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

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

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

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

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

No Additional Feature	00
Closing and Opening Speed Control	03
Electronic Control	18

Double Chamber	B
Large Control Filter	F
Electric Limit Switch	S
Valve Position Transmitter	Q
Flow Over the Seat	O
3-Way Control Loop	X
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

Multiple choices permitted

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Booster Pump Control Valve

Quick Active Check Valve

- 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

- 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**

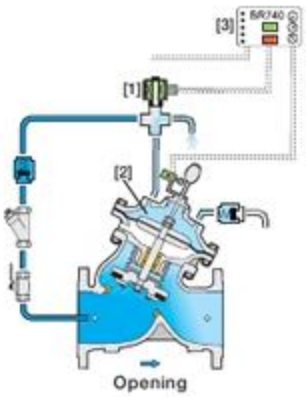
See relevant BERMAD publications.

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

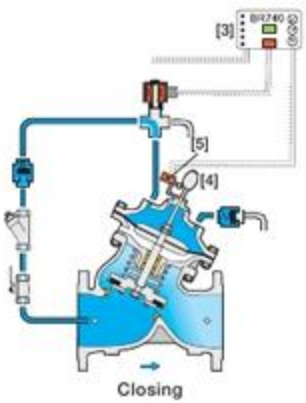
Prior to pump start, the valve is hydraulically closed although electrically open. Even though the de-energized solenoid **[1]** vents the upper control chamber **[2]**, it remains full as no opening hydraulic forces are applied. Pump start command is issued to the BR740-E electronic controller **[3]**, 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.



Opening

Pump Stopping Procedure

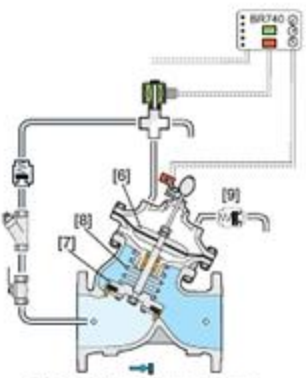
In pumping systems with standard check valves, the shut down command is issued directly to the pump, abruptly shutting it down. In systems with "active check valves", the shut down command is issued to the BR740-E electronic controller **[3]**, which energizes the solenoid. The solenoid then applies 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.



Closing

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.



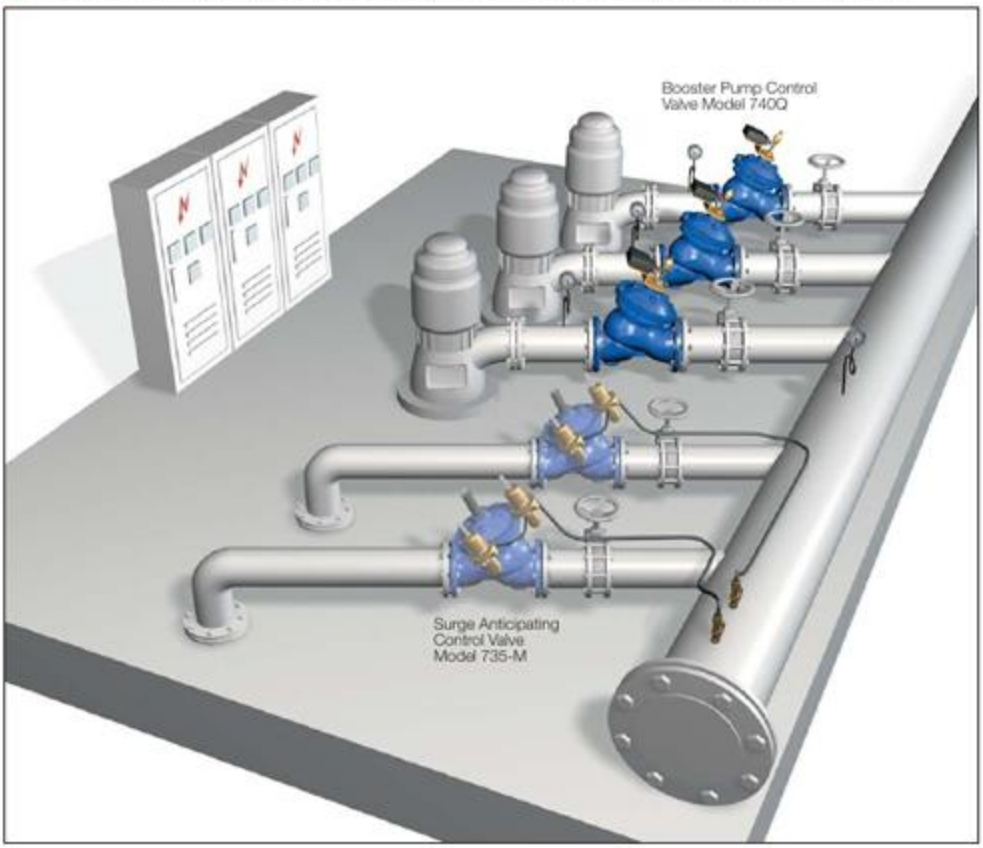
Closed (After Power Failure)

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

Typical Installation

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

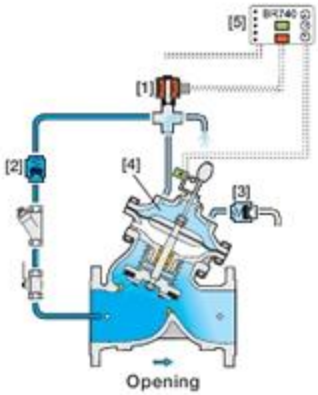
The BR 740-E coordinates between all system components to eliminate surges from the system. This controller provides built-in operating modes that can be selected on-site. These modes are based on accumulated know-how to prevent errors that might occur during on-site programming.

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

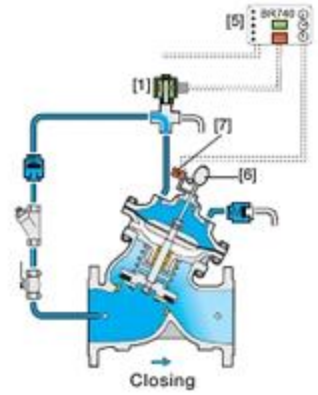
Prior to pump start, the valve is closed hydraulically and electrically. The de-energized solenoid **[1]** together with the inlet check valve **[2]** and the airflow check valve **[3]**, trap the pressure in the upper control chamber **[4]**. Pump start command is issued to the BR740-E electronic controller **[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.



Opening

Pump Stopping Procedure

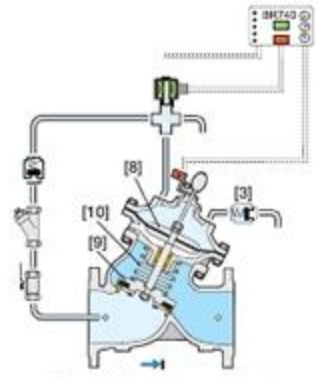
In pumping systems with standard check valves, the shut down command is issued directly to the pump, abruptly shutting it down. In systems with "active check valves", the shut down command is issued to the BR740-E electronic controller **[5]**, which de-energizes the solenoid **[1]**. The solenoid then 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.



Closing

Power Failure – Spring Loaded, Zero Velocity Non Return Valve

If electric power fails during pumping, the upstream pressure immediately drops causing the hydraulic forces acting on the diaphragm assembly **[8]** and closure **[9]** to balance. The spring **[10]** then breaks this balance, closing the valve before the flow can change direction. Check valve **[3]** allows airflow into the upper control chamber to break possible vacuum and quicken the closing speed.



Closed (After Power Failure)

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

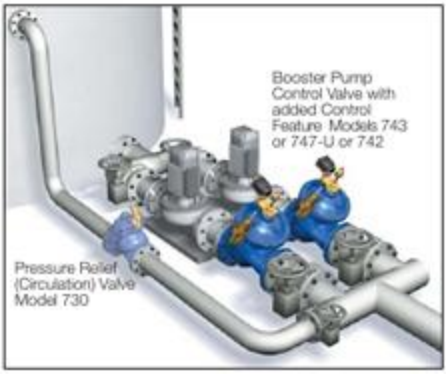
Additional Applications

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 seguence of the standard Model 740Q.

Engineer Specifications

The Pump Control Valve shall open fully or shut off in response to electric signals. It shall isolate the pump from the system during pump starting and stopping, to prevent pipeline surges.

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 3-Way solenoid pilot (for 8" and larger valves, an accelerator shall be added to the solenoid), two check valves (for 12" and larger valves, an additional check valve), a limit switch, 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 main valve shall be certified as a complete drinking water valve according to NSF, WRAS, and other recognized standards.

BERMAD Waterworks

700 Series

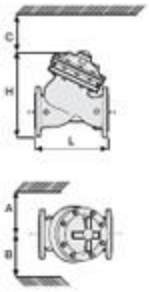
Model 740Q

Technical Data

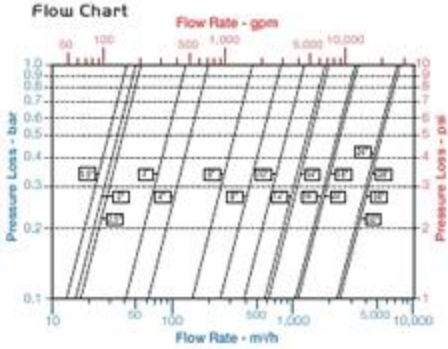
Dimensions and Weights

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 disk 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 Nylon fabric-reinforced
Seals: NBR
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
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Solenoid Standard Materials:
Body: Brass or Stainless Steel
Elastomers: NBR or FPM
Enclosure: Molded epoxy
Solenoid Electrical Data:
Voltages: (ac): 24, 110-120, 220-240, (50-60 Hz) (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

Accelerator Standard Materials:
Body: Brass or Stainless Steel
Internals: Stainless Steel & Brass
Elastomers: NBR or FPM

Solenoid Selection

Valve Size	Solenoid Model 330 (2.0 mm)	Solenoid Model 311 (1.0 mm)	Accelerator Model 54	Accelerator Model 58HC
1½-8"	■			
1½-6"		■		
10-20"	■		■	
8-20"		■	■	
24-32"	■			■
24-32"		■		■
	PN 16		PN 25	

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

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"	740Q	00	Y	C	16	EB	4AO	CB	S

Sector: WW — Waterworks
Size: 1¼ - 32"
Primary Feature: 740Q — Booster Pump Control

Additional Feature:
- 00 — No Additional Feature
- 03 — Closing and Opening Speed Control
- 18 — Electronic Control

Multiple choices permitted

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

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

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

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

Voltage & Position:
- 4AC — 24VAC/50Hz - N.C.
- 4AO — 24VAC/50Hz - N.O.
- 4DC — 24VDC - N.C.
- 4DO — 24VDC - N.O.
- 4DP — 24VDC - L.P.
- 2AC — 220VAC/50-60Hz N.C.
- 2AO — 220VAC/50-60Hz N.O.

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

Additonal Attributes:
- B — Double Chamber
- F — Large Control Filter
- S — Electric Limit Switch
- Q — Valve Position Transmitter
- O — Flow Over the Seat
- X — 3-way Control Loop
- N — St. St. 316 Control Accessories
- T — St. St. 316 Internal Trim (Closure & Seat)
- D — St. St. 316 Actuator Internal Assembly
- R — Delrin Bearing
- E — Viton Elastomers for Seals & Diaphragm
- 6 — Pressure Gauge

Multiple choices permitted

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Booster Pump Control and Pressure Sustaining Valve

Active Check Valve

- 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)
- Pump overload and cavitation protection
- Controlled pipeline fill-up

The Model 743 Booster Pump Control & Pressure Sustaining Valve is a hydraulically operated, diaphragm actuated active check valve that opens or shuts off in response to electric signals. It isolates the pump from the system during pump starting and stopping, to prevent pipeline surges. While open, it sustains minimum discharge pressure regardless of fluctuating flow.

Features and Benefits

- **Line pressure driven**
  - Independent operation
  - No motor required
  - Long term drip tight sealing
- **Solenoid controlled**
  - Low power consumption
  - Low cost wiring
  - Wide ranges of pressures and voltages
  - Normally Open or Normally Closed
- **Check feature (spring loaded type)**
  - Replaces line sized check valve
  - Fail-safe mechanical closure
- **In-line serviceable** – Easy maintenance
- **Double chamber design**
  - Non-slam opening and closing characteristic
  - Protected diaphragm
- **Balanced seal disk** – High flow capacity

Major Additional Features

- Pump differential pressure sustaining – **743-06**
- Electronic control – **743-18**
- Pressure sustaining & Pressure reducing – **743-2Q**

See relevant BERMAD publications.

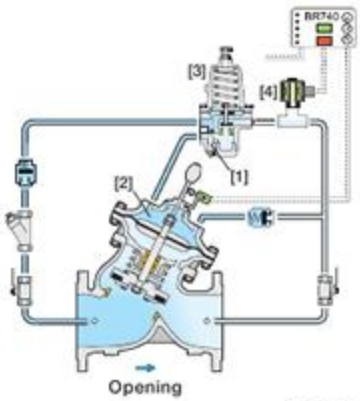
Sequence of Operation (Normally Open Type)

The Model 743 is a pilot controlled valve equipped with an adjustable, 2-Way, pressure sustaining pilot (optional with sealed spring cell), a 2-Way solenoid pilot (optional 3-Way), a limit switch and check valves.
Two optional solenoid control circuits are available:

- 2-Way solenoid (see explanations & drawings below)
- 3-Way solenoid, controlling the pressure sustaining pilot sealed spring cell

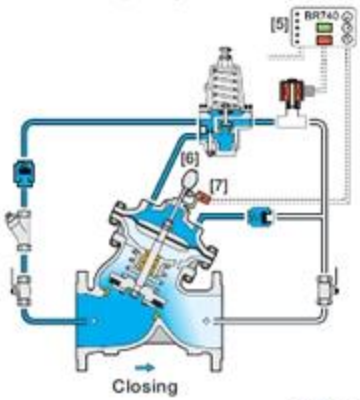
Pump Starting Procedure

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



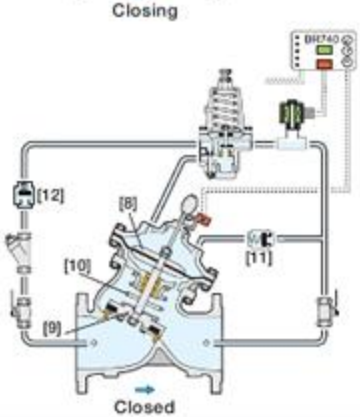
Pump Stopping Procedure

In pumping systems with standard check valves, the shut-down command is issued directly to the pump, abruptly shutting it down.
In systems with "active check valves", the shut-down command is issued to the BR740-E electronic controller **[5]** which energizes the solenoid. The solenoid then closes, stopping release of pressure from the upper control chamber, gradually closing the main valve. As the indictor collar **[6]** moves down, it activates the limit switch **[7]**, 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 **[8]** and closure **[9]** to balance. The spring **[10]** then breaks this balance, closing the valve before the flow can change direction. Once the main valve has closed, the check valve **[11]** allows downstream pressure into the upper control chamber while the check valve **[12]** traps it, resetting the main valve for the next pump starting process.



Typical Applications

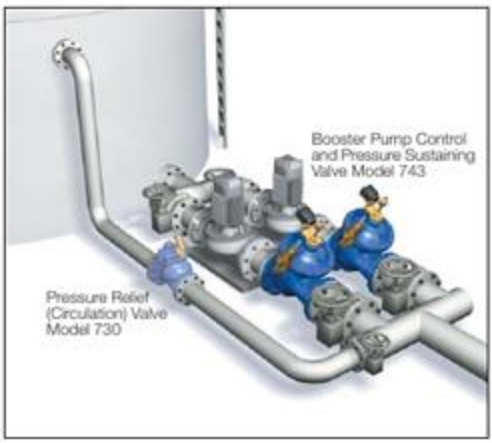
Network Over Demand

Network demand is greater than pump design specifications:

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

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

The Model 743, by adding a pressure sustaining feature to the Booster Pump Control Valve, ensures that the pump operates within design specifications protecting both the pump and the system.



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.

Engineer Specifications

The Pump Control & Pressure Sustaining Valve shall open or shut off in response to electric signals. It shall isolate the pump from the system during pump starting and stopping, to prevent pipeline surges. While open, it shall sustain minimum discharge pressure regardless of fluctuating flow.

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 solenoid pilot, an adjustable, direct acting, 2-Way pressure sustaining pilot, two check valves (for 12" valves and larger, an additional check valve), a limit switch, two isolating cock valves, and a filter. All fittings shall be forged brass or stainless steel. The assembled valve shall be hydraulically tested.

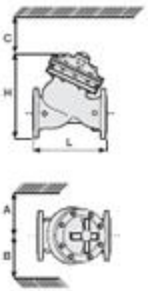
Quality Assurance: The valve manufacturer shall be certified according to the ISO 9001 Quality Assurance Standard. The main valve shall be certified as a complete drinking water valve according to NSF, WRAS, and other recognized standards.

Technical Data

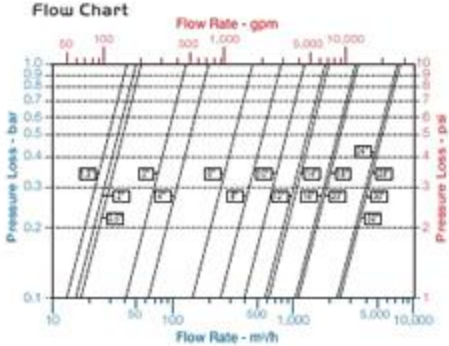
Dimensions and Weights

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	129	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	646	1860
450	18"	645	26	965	38	1000	39.4	1127	44.4	945	2083
500	20"	645	26	965	38	1105	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 disk 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 Nylon fabric-reinforced
Seals: NBR
Coating:
Fusion Bonded Epoxy, RAL 5005 (Blue)
NSF & WRAS approved or Electrostatic Polyester Powder, RAL 6017 (Green)

Control System

Standard Materials:
Accessories: Bronze, Brass, St.Steel & NBR
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Pilot Standard Materials:
Body: Brass, Bronze or Stainless Steel
Elastomers: NBR
Internals: Stainless Steel
Solenoid Standard Materials:
Body: Brass or Stainless Steel
Elastomers: NBR or FPM
Solenoid Electrical Data:
Voltages:
(ac): 24, 110-120, 220-240, (50-60 Hz)
(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
For pressure sustaining pilot valve selection table, refer to Model 730.

Solenoid Selection

Valve Pressure Rating	Solenoid Control Circuit			
	2-Way		3-Way	
	281	404	330	311
PN 16	■		■	
PN 25		■		■

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 (DIN): 96 x 96 x 166 mm, 0.75 kg
Housing material: NORYL (DIN 43700)
Limit Switch
Switch type: SPDT
Electrical rating: 10A, type gI or gG
Enclosure rating: IP66

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"	743	00	Y	C	16	EB	4AO	CB	S

Sector
Waterworks: WW

Size
1½ - 32": 6"

Primary Feature
Booster Pump Control & Pressure Sustaining: 743

Additional Feature
No Additional Feature: 00
Closing and Opening Speed Control: 03
Differential Pressure Sustaining: 06
Electronic Control: 18
Pressure reducing feature: 2Q
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
Epoxy FB Blue: EB
Polyester Green: PG
Polyester Blue: PB
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

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

Additonal Attributes
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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Pump Circulation and Pressure Sustaining Control Valve

Pump Check Valve Enhancer

- 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)
- Applicable to existing systems
- Controlled pipeline fill-up

The Model 748 Pump Circulation and Pressure Sustaining Control Valve adds the advanced "active check valve" logic to standard pump systems. It is a hydraulically operated, diaphragm actuated control valve that opens or shuts off in response to electric signals (during the pump starting and stopping processes) while sustaining discharge pressure. By progressively circulating pump flow, it enables a standard mechanical check valve to respond gradually during the pump starting and stopping processes, preventing pipeline surges.

Features and Benefits

- **Line pressure driven**
  - Independent operation
  - No motor required
  - Long term drip tight sealing
- **Off-line (circulation) installation**
  - Replaces in-line "active check valve"
  - Reduced system energy consumption
  - Low capital investment
  - Short valve operating time
  - Applicable to existing systems
- **Solenoid controlled**
  - Wide ranges of pressures and voltages
  - Low cost wiring
- **In-line serviceable** – Easy maintenance
- **Double chamber**
  - Full powered opening and closing
  - Non-slam opening and closing characteristic
  - Protected diaphragm

Major Additional Features

- Relief override – **748-3Q**
- Electronic control – **748-18**
- Pump circulation and flow control valve – **749-U**
- Deep well pump electric control valve – **745**

See relevant BERMAD publications.

Principle of Operation

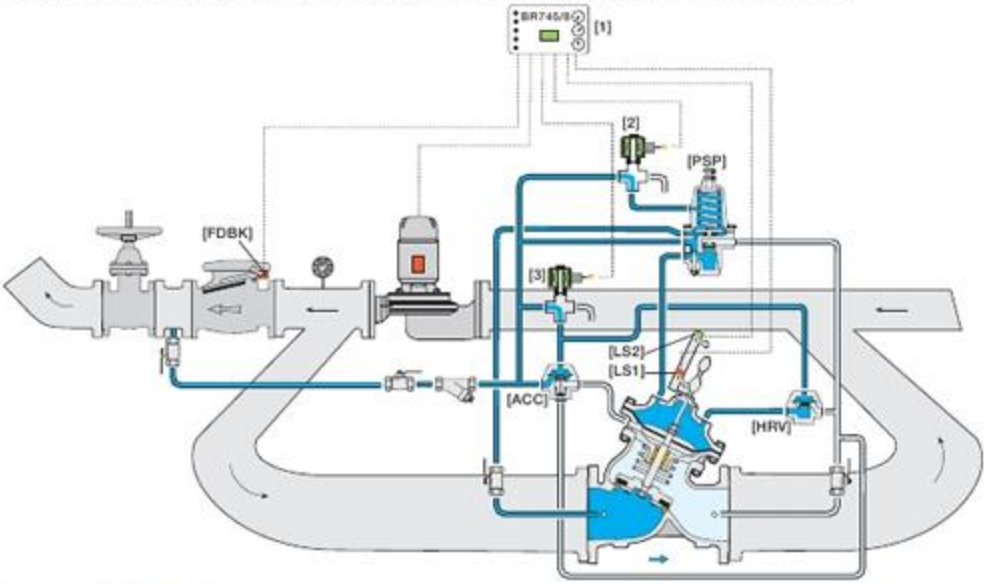
The Model 748 Pump Circulation and Pressure Sustaining Control Valve, installed off-line, enhances standard pump systems with advanced "active check valve" logic. It is particularly suited to:

- Large diameter systems where line sized automatic control valves are not available or very expensive
- Existing systems with mechanical check valves
- System designs where mechanical check valves are preferred

During the pump starting and stopping processes the Model 748 circulates zero to 100% of pump discharge to suction, while sustaining discharge pressure slightly below system static pressure. It prevents pipeline surges by enabling a standard mechanical check valve to respond gradually:

- When the pump starts, it gradually closes, increasing check valve upstream pressure
- Prior to pump stop, it gradually opens, reducing that pressure

Complete process control is accomplished by a dedicated controller that coordinates all system components.
The controller consists of three timers (TD1, TD2 & TD3) used for timing the process and for failure control.



Sequence of Operation

Prior to pump starting

The pump is off, the check valve and Model 748 are closed.

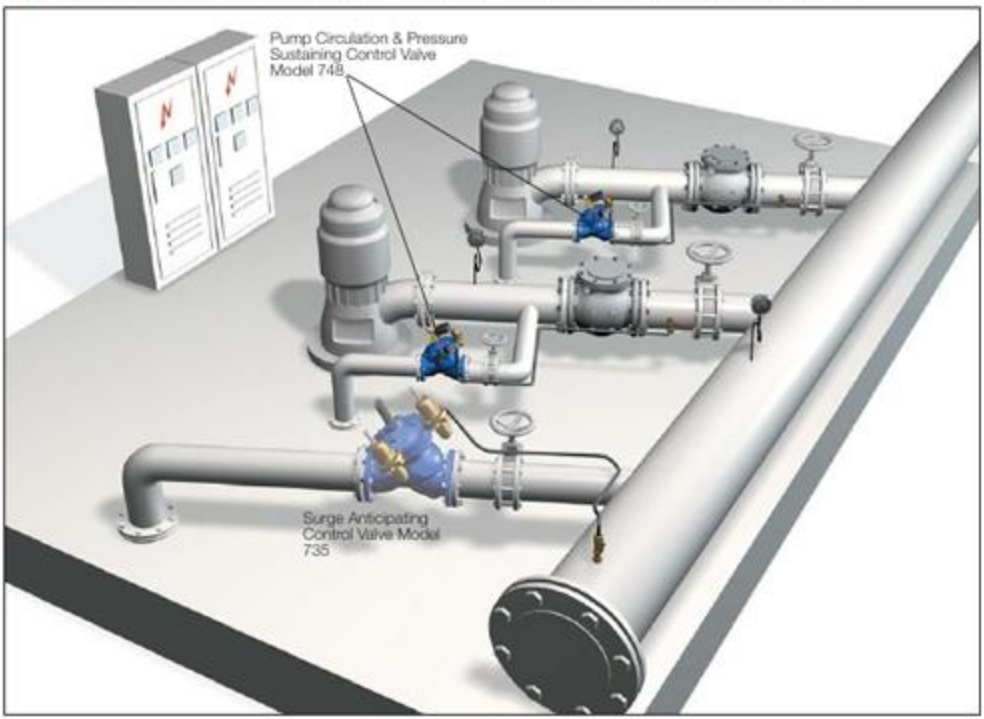
Pump starting

1. An external starting signal is sent to the controller BR745/8-E **[1]**
2. The Controller triggers TD1 and energizes solenoids **[2]** and **[3]** to power open the Model 748.
3. The upper limit switch **[LS2]** contact closes, confirming that the Model 748 is fully open.
4. The controller simultaneously triggers TD2, starts the pump, and initiates the pressure sustaining function of the Model 748 by de-energizing solenoid **[3]**.
5. At the end of TD2, the controller simultaneously triggers TD3 and de-energizes solenoid **[2]** gradually closing the Model 748 (gradually directing the discharge to the main line).
6. The closed Model 748 closes **[LS1]** contacts and allows pump discharge to open the check valve closing **[FDBK]** contacts.

Typical Installation

In this system, a pump battery supplies the main line through a manifold. Where standard mechanical check valves are specified or already exist, the Model 748 enhances their function by:

- Preventing surge generation rather than minimizing surge damage
- Providing surge free on and off-line sequencing of single speed pumps
- Surge free switching between "on-duty" pumps
- Delaying variable speed primary pump reaction to single speed supplementary pump going on or off-line



BR 745/8-E Electronic Controller

The BR 745/8-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.

Continuous pumping

The pump is on, the check valve is open & the Model 748 is closed.

Pump stopping

7. An external shut-down signal is sent to the controller.
8. The controller triggers TD3 and energizes solenoid **[2]** to open the Model 748 (gradually directing the discharge out of the main line) while sustaining discharge pressure to slightly below system static pressure.
9. Reduced discharge pressure upstream from the mechanical check valve allows it to gradually close. The closed check valve opens **[FDBK]** contacts signaling the controller that the check valve is closed.
10. The controller simultaneously triggers TD2, shuts down the pump, and de-energizes solenoid **[2]** to close the Model 748.

The closed Model 748 closes **[LS1]** contact.

The system is now ready for the next pump starting procedure.

Time Delays

Item	Pump Stage	Time delay
TD1	Starting **(2)**	Failure parameter after which Model 748 is expected to be fully open
TD2	Starting **(4) & (5)**	Process parameter during which all discharge is circulated
	Stopping **(10)**	Failure parameter after which Model 748 is expected to close
TD3	Starting **(5)**	Failure parameter during which the check valve is expected to open
	Stopping **(8)**	Failure parameter during which the check valve is expected to close

Engineer Specifications

The Pump Circulation & Pressure Sustaining Control Valve shall open or shut off in response to electric signals (during pump starting and stopping processes). When open, it shall sustain discharge pressure. By progressively circulating pump flow, it shall enable a standard mechanical check valve to respond gradually during the pump starting and stopping processes, preventing pipeline surges.

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.

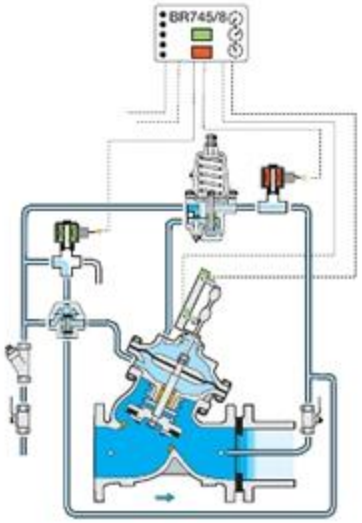
Control System: The control system shall consist of two 3-Way solenoid pilots, a 2-Way adjustable, direct acting pressure sustaining pilot, an accelerator, a hydraulic relay valve, two limit switches, three isolating cock valves and a filter. All fittings shall be forged brass or stainless steel. The assembled valve shall be hydraulically tested.

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

Additional Applications

Pump Circulation & Flow Control Valve Model 749-U

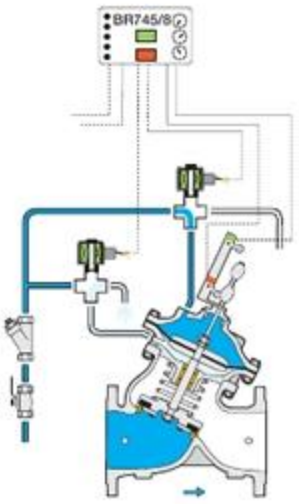
Pumps are subject to overload and cavitation damage when circulation flow is greater than pump design specifications. When the pump curve (Flow versus Pressure) is relatively steep, the Model 748 Pump Circulation & Pressure Sustaining Valve is the most suitable for protection.
However, when the pump curve is relatively flat, pump protection with respect to discharge pressure is not sufficient. Protection according to flow is recommended. The Model 749-U protects the pump by actually limiting the flow.
Complete process control is accomplished by the dedicated controller BR 745/8-E that coordinates all system components.



Deep Well Pump Electric Control Valve Model 745

Standard operating procedure of deep well pumps requires that initial discharge water is routed to waste disposal (oil, sand, etc.). The Model 745 Deep Well Pump Electric Control Valve, installed off-line, together with the BR 745/8-E Electronic Controller provides:

- Full powered valve opening prior to pump start
- Routing 100% of initial pump discharge to waste disposal for a pre-set time
- Gradually increasing and decreasing pump discharge flow into the main line (preventing surge)
- Short periods of valve operation (high valve durability)



BERMAD Waterworks

700 Series

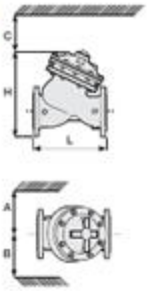
Model 748

Technical Data

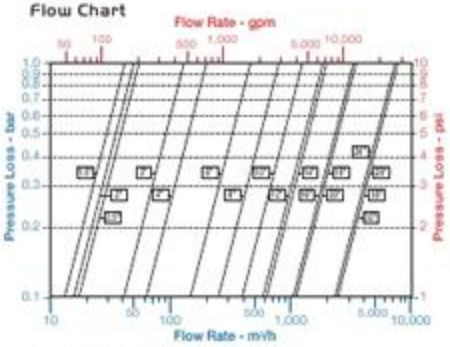
Dimensions and Weights

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	479
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 disk 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 Nylon fabric-reinforced
Seals: NBR
Coating:
Fusion Bonded Epoxy, RAL 5005 (Blue)
NSF & WRAS approved or Electrostatic
Polyester Powder, RAL 6017 (Green)

Control System

Standard Materials:
Accessories: Bronze, Brass, St.Steel & NBR
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Pilot Standard Materials:
Body: Brass, Bronze or Stainless Steel
Elastomers: NBR
Internals: Stainless Steel
Solenoid Standard Materials:
Body: Brass or Stainless Steel
Elastomers: NBR or FPM
Solenoid Electrical Data:
Voltages:
(ac): 24, 110-120, 220-240, (50-60 Hz)
(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
For pressure sustaining pilot valve selection table, refer to Model 730.

Solenoid Selection

Valve Size	Solenoid Model		Accelerator /HRV	
	330 (2.0 mm)	311 (1.0 mm)	54 / 50	2x 58HC
1½-20"	■		■	
1½-20"		■	■	
24 -32"	■			■
24 -32"		■		■
PN 16			PN 25	

BR 740-E Controller
Supply voltage: 110, 230 V(ac) 50/60 Hz
Power consumption: <8 VA
Solenoid circiut fuse: 2A (Internal)
Pump control circuit fuse: 1A (Internal)
Dimensions (DIN): 96 x 96 x 166 mm, 0.75 kg
Housing material: NORYL (DIN 43700)
Limit Switch
Switch type: SPDT
Electrical rating: 10A, type gl or gG
Enclosure rating: IP66

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"	748	00	Y	C	16	EB	4AC	CB	SS

Sector
Waterworks: WW

Size
1½ - 32": 6"

Primary Feature
Pump Circulation & Pressure Sustaining: 748

Additional Feature
No Additional Feature: 00
Closing and Opening Speed Control: 03
Relief Override: 3Q
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
Epoxy FB Blue: EB
Polyester Green: PG
Polyester Blue: PB
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

When static pressure is less than 1.5 bar (20 psi) - consult factory

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

Additonal Attributes
V-Port Throttling Plug: V
Large Control Filter: F
Electric Limit Switch: S
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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Level Control Valve

with Modulating Horizontal Float

- Reservoir filling
  - Low volume reservoirs
  - Large surface area reservoirs

The Model 750-60 Level Control Valve with Modulating Horizontal Float is a hydraulically controlled, diaphragm actuated control valve that controls reservoir filling to maintain constant water level, regardless of fluctuating demand.

Features and Benefits

- **Line pressure driven** – Independent operation
- **Modulating hydraulic float control**
  - "Always Full" reservoir
- **Double chamber**
  - Full powered closing
  - Non-slam closing characteristic
  - Protected diaphragm
- **External installation**
  - Easy access to valve and float
  - Less wear and tear
- **Balanced seal disk** – High flow capacity
- **In-line serviceable** – Easy maintenance
- **Flexible design** – Easy addition of features

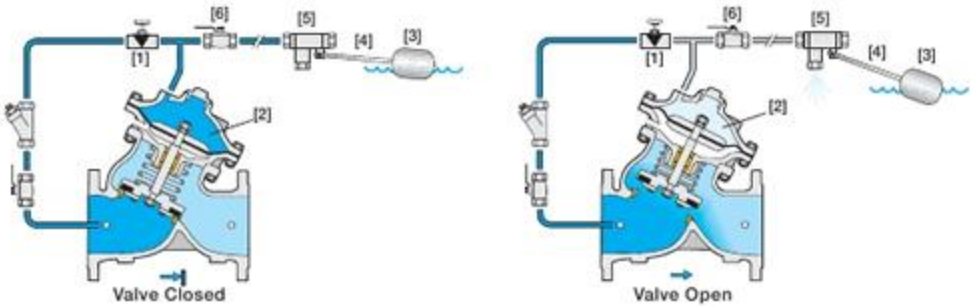
Major Additional Features

- Pressure sustaining – **753-60**
- Flow control – **757-60-U**
- Electric float backup – **750-60-65**

See relevant BERMAD publications.

Operation

The Model 750-60 is a float controlled valve equipped with a 2-Way, horizontal float pilot assembly.
The needle valve **[1]** continuously allows flow from valve inlet into the upper control chamber **[2]**. The float **[3]** is attached to the float pilot arm **[4]**.The location of the float assembly & the position of the float determines the level setting.
Should level rise towards setting, the float pilot **[5]** throttles, pressure in the upper control chamber accumulates causing the main valve to throttle closed, reducing filling rate, and eventually closing drip tight.
Should level fall, the float pilot releases pressure from the upper control chamber causing the main valve to modulate open.
The needle valve controls the closing speed. The cock valve **[6]** enables manual closing.



Engineer Specifications

The Level Control Valve shall control reservoir filling to maintain constant water level regardless of fluctuating demand.

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, horizontal float pilot assembly, 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.

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

Typical Applications

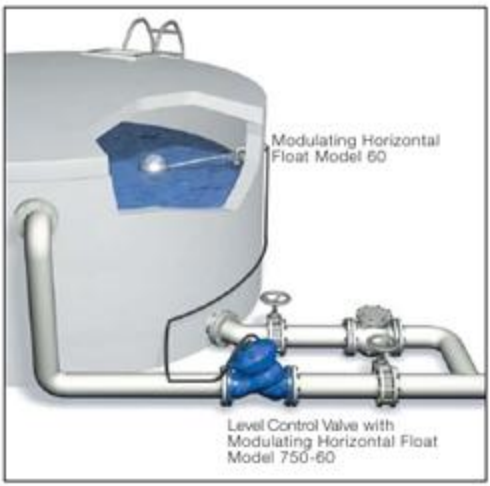
Infrastructure Installation

Ordinary mechanical level control valves present various problems:

- Valves are often at inaccessible locations
- Float and arm assemblies are heavy and cumbersome
- Relatively low maximum pressure
- Tendency for mechanical devices to leak
- Increased valve corrosion due to humid environment inside the tank
- Difficult maintenance

The Model 750-60 overcomes these difficulties by separating the mechanical float from the hydraulic valve itself.
Consider replacing the "60" horizontal float assembly with the "67" vertical float assembly for:

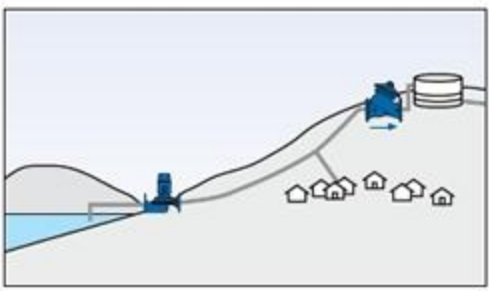
- Heavy-duty service
- Easy level setting
- Resistance to aggressive or corrosive fluids



Level Control Valve with Modulating Horizontal Float Model 750-60

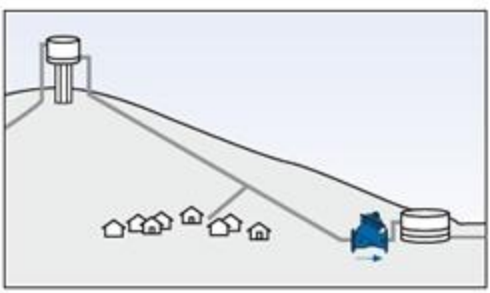
Pumping to Uphill Reservoir

In a reservoir system, where a **pump provides pressure**, consumers are prioritized over reservoir filling by installing the **Model 753-60** 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 757-60-U** Level and Flow Control Valve.

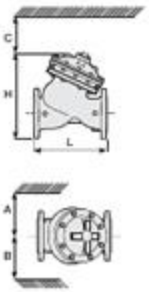


Technical Data

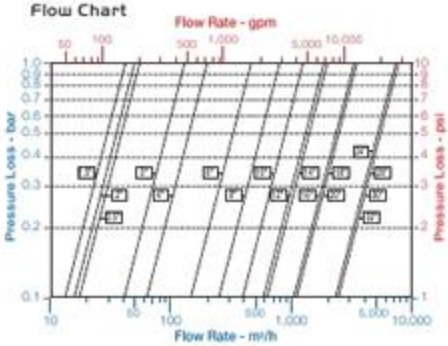
Dimensions and Weights

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	840	1863
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 disk valves
For more flow charts, refer to Engineering Section

Main Valve

Valve Patterns: "Y" (globe) & angle
Size Range: 1"/₈-32" (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 Nylon fabric-reinforced
Seals: NBR
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
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Float Standard Materials:
Pilot body: Stainless Steel or Brass
Internals: Plastic
Working temperature:
Water up to 50°C (125°F)
Pressure rating: 16 bar (230 psi)

- 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	60	–	Y	C	16	EB	–	CB	VI
Waterworks	1⅛ - 32"	Level Control									

Primary 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

Additional Feature

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

Epoxy FB Blue	EB
Polyester Green	PG
Polyester Blue	PB
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 additional electric control feature is selected

Tubing & Fittings

Copper Tubing & Brass Fittings	CB
Plastic Tubing & 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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Level Control Valve

with Bi-Level Electric Float

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

The Model 750-65 Level Control Valve with Bi-Level Electric Float is a hydraulically operated, diaphragm actuated control valve that controls reservoir filling in response to an electric float switch signal, opening at pre-set low level and shutting off at pre-set high level. The double chamber actuated Model 750-65-B is powered to fully open and close even at very low pressure.

Features and Benefits

- **Line pressure driven** – Independent operation
- **Bi-Level electric float switch**
  - On/off service
  - Low cavitation damage
  - No hydraulic sensing tubes
  - Simplified float installation and setting
  - Suited to various float switches
- **Solenoid controlled**
  - Low power consumption
  - Normally Open or Normally Closed main valve
- **Double chamber**
  - Full powered closing
  - Low throttling noise
  - Non-slam closing characteristic
  - Protected diaphragm
- **External installation**
  - Easy access to valve and float
  - Less wear and tear
- **In-line serviceable** – Easy maintenance

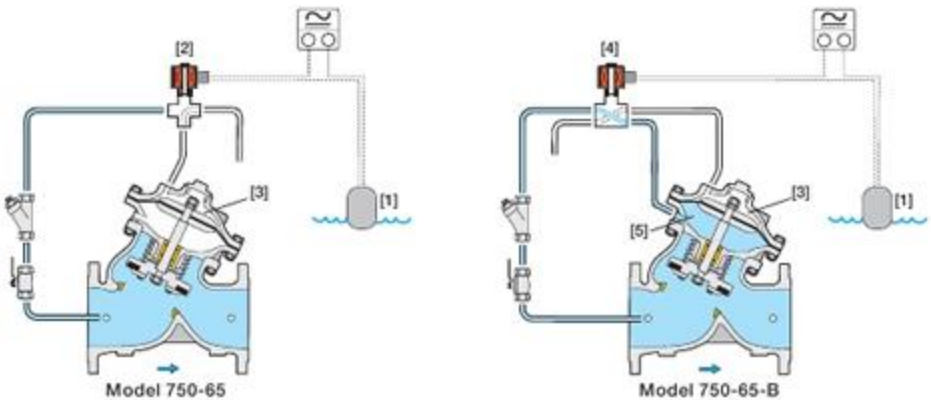
Major Additional Features

- Full powered opening & closing – **750-65-B**
- Closing surge prevention – **750-65-49**
- Hydraulic float backup – **750-65-66**
- Altitude pilot backup – **750-65-80**
- Relief override – **750-65-3Q**
- Pressure sustaining valve – **753-65**
- Flow control valve – **757-65-U**
- Level sustaining – **75A-65**

See relevant BERMAD publications.

Operation

The Model 750-65 is a solenoid controlled valve equipped with a bi-level electric float switch* and a solenoid pilot.**
The float switch **[1]** closes at pre-set low level, energizing the solenoid **[2]**, and opens at pre-set high level, de-energizing it.
Should the level drop, the solenoid is energized, causing the upper control chamber **[3]** to vent, opening the main valve.
Should the level rise, the solenoid is de-energized, and pressure is applied to the upper control chamber harnessing line pressure to close the main valve.
For 8" (200 mm) valves and larger, an accelerator quickens valve response.
For full powered operation (Model 750-65-B): The 4-Way solenoid **[4]**, when energized, actively pressurizes the lower chamber **[5]** to powerfully open the main valve.
* Other switching means are available.
** Normally Closed and Normally Open main valves are available.



Model 750-65 Model 750-65-B

Engineer Specifications

The Level Control Valve shall control reservoir filling in response to an electric float switch signal, opening at pre-set low level and shutting off at pre-set high level. The double chamber actuated Model 750-65-B shall be powered to fully open and close even at very low 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.

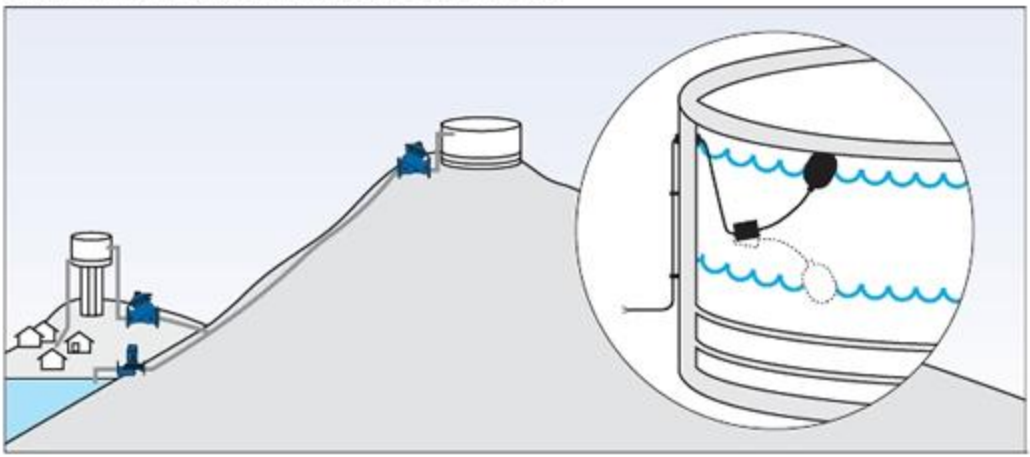
Actuator: The actuator assembly shall be double chambered with an inherent separating partition between the lower surface of the diaphragm and the main valve. The entire actuator assembly (seal disk to top cover) shall be removable from the valve as an integral unit. The stainless steel valve shaft shall 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 an electrical level sensor, a solenoid pilot (for 10" and larger valves, an accelerator shall be added to the solenoid), an isolating 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 main valve shall be certified as a complete drinking water valve according to NSF, WRAS, and other recognized standards.

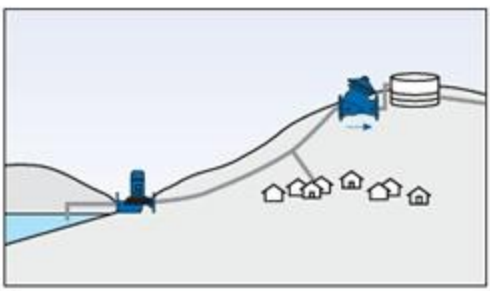
Typical Applications

Reservoirs vary in their characteristics – location, elevation, filling & emptying, flow & pressure, surface area, etc. These various characteristics require various level control valve solutions.
The Model 750-65 is the ideal solution for level control in reservoirs – shallow and deep, low and high elevation, rooftop and basement, in water towers, and wherever electric power is available.



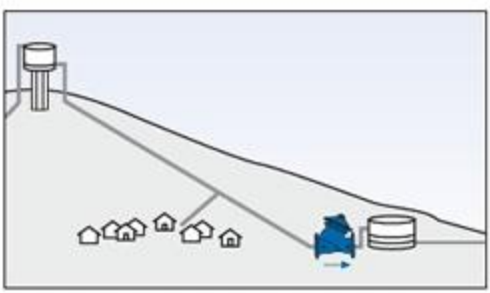
Pumping to Uphill Reservoir

In a reservoir system where a **pump provides pressure**, consumers are prioritized over reservoir filling by installing the **Model 753-65** Level Control and Pressure Sustaining Control Valve.



Gravity Filling a Downhill Reservoir

Where a **reservoir provides pressure** to consumers and fills a lower elevation 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 757-65-U** Level and Flow Control Valve.

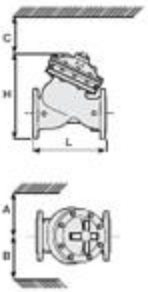


Technical Data

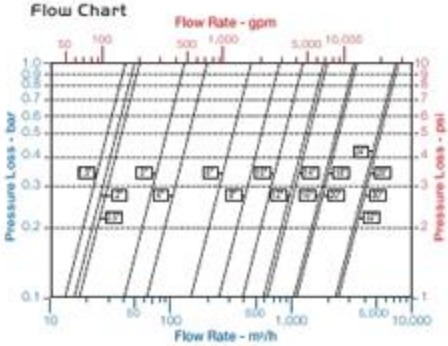
Dimensions and Weights

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	10.5	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	840	1863
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 disk valves
For more flow charts, refer to Engineering Section

Main Valve

Valve Patterns: "Y" (globe) & angle
Size Range: 1"/₈-32" (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 Nylon fabric-reinforced
Seals: NBR
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
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Solenoid Standard Materials:
Body: Brass or Stainless Steel
Elastomers: NBR, or FPM (Viton®)
Enclosure: Molded epoxy
Solenoid Electrical Data:
Voltages:
(ac): 24, 110-120, 220-240, (50-60 Hz)
(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

Float switch
Max. Current: 16A@250V
Fluid specific weight: 0.95-1.10
Working temperature:
Water up to 60°C (140°F)
Dimensions: Length – 124 mm (4.9")
Width – 90 mm (3.5")
Cable length – 4.9 m (16 ft.)

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	65	–	Y	C	16	EB	4AC	CB	VI
Waterworks	1⅛ - 32"	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

Epoxy FB Blue	EB
Polyester Green	PG
Polyester Blue	PB
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

Tubing & Fittings

Copper Tubing & Brass Fittings	CB
Plastic Tubing & 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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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 and closing
  - Decreased pressure loss
  - No throttling noise
  - Non-slam closing characteristic
  - Protected diaphragm
- **External installation**
  - Easy access to valve and 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

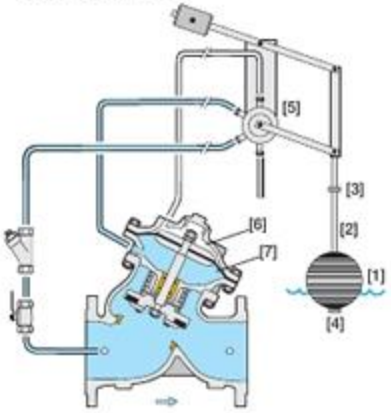
- Pressure sustaining – **753-66**
- Electric float backup – **750-66-65**
- Flow control – **757-66-U**
- Closing surge prevention – **750-66-49**
- Level sustaining – **75A-66**

See relevant BERMAD publications.

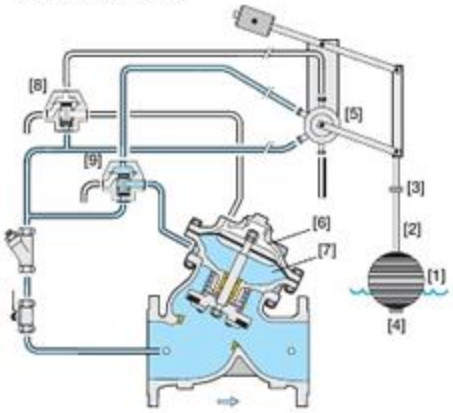
Operation

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]** quicken valve response.

Size range-1 1/2-8"



Size range-10-20"



Engineer 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.

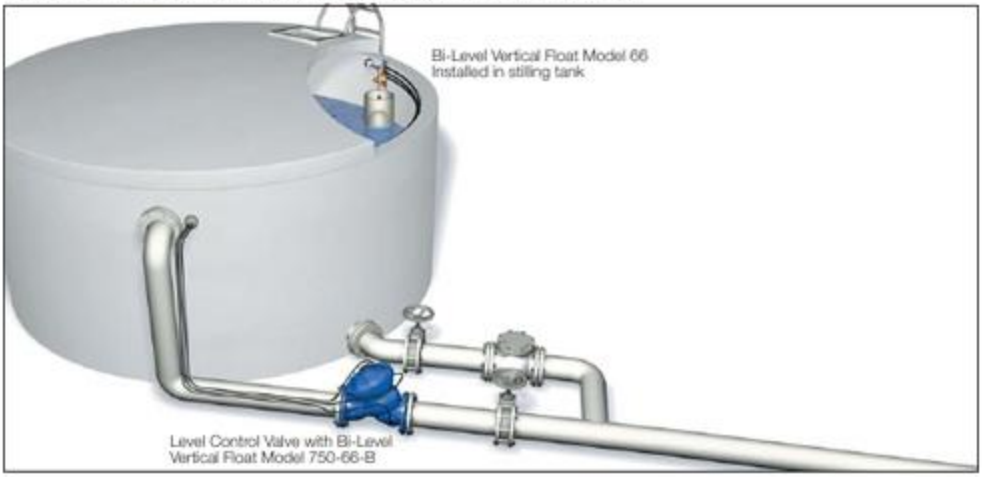
Control System: The control system shall consist of a 4-Way, "last position", adjustable bi-level, hydraulic float pilot assembly, an isolating cock valve, (for 10" valves and larger: two accelerators), and a filter. All fittings shall be forged brass or stainless steel. The assembled valve shall be hydraulically tested.

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

Typical Applications

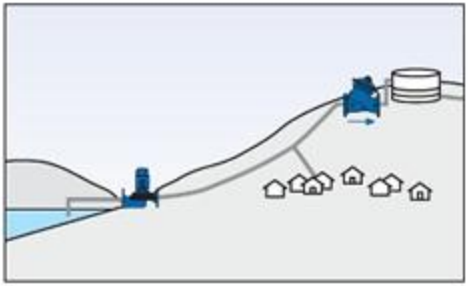
Infrastructure Reservoirs

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

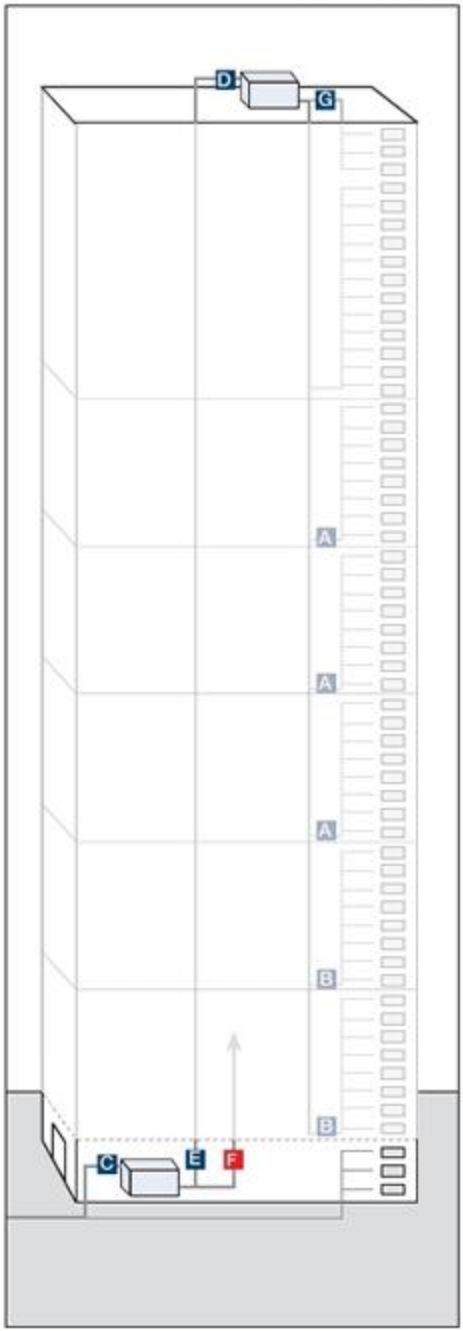
Where a **reservoir provides pressure** to consumers and fills a low lying reservoir, the consumers should be prioritized over filling the lower reservoir.
Defining the pressure set point for the standard level control and pressure sustaining valve is usually impossible, as there is only a very small 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 High-Rise Buildings

Water supply system design requirements for high-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 high-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 floor 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 backed by BERMAD'S accumulated know-how, addresses these issues and presents 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 backup 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.

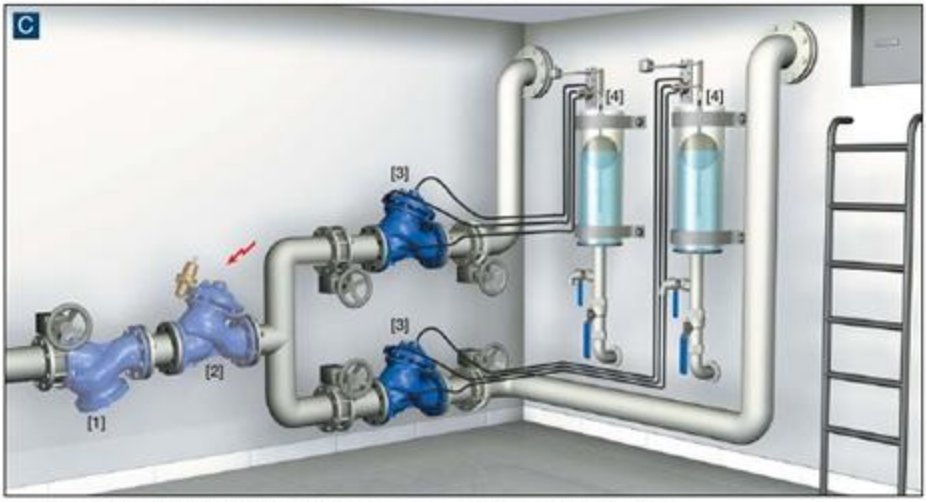
Basement Reservoirs

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: To prevent debris from damaging valve operation.
[2] Pressure Sustaining Valve Model 730-65: To ensure municipal supply to lower floors & provide electric backup.
[3] Parallel Redundant Branch Model 750-66-B: To ensure uninterrupted supply.
[4] Float Assembly: To allow out-of-tank installation.

700 Series

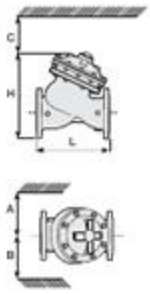
Model 750-66-B

Technical Data

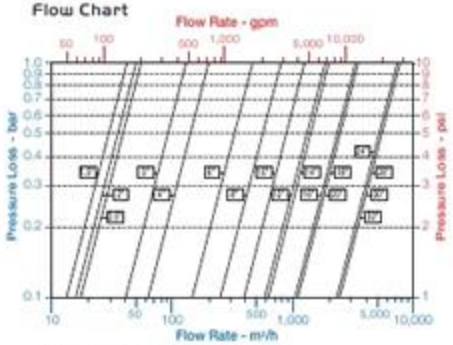
Dimensions and Weights

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	28
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	355	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	391	840
400	16"	645	26	965	38	990	39.0	1108	43.6	848	1885
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 disk 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 Nylon fabric-reinforced
Seals: NBR
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
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Float Standard Materials
Pilot body: Brass
Seals: NBR
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
Waterworks	1 ¼ - 32"	Level Control									

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

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

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

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

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 additional electric control feature is selected

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

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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Level Control Valve

with Modulating Vertical Float

- Reservoir filling
  - Low volume reservoirs
  - Large surface area reservoirs
  - Hydraulic backup
- Reservoir outlet
  - Reservoir level sustaining
  - Pump flow modulating

The Model 750-67 Level Control Valve with Modulating Vertical Float is a hydraulically controlled, diaphragm actuated control valve that controls reservoir filling to maintain constant water level, regardless of fluctuating demand.
The modified Model 75A-67, installed at reservoir outlet, sustains minimum reservoir level.

Features and Benefits

- **Line pressure driven** – Independent operation
- **Modulating hydraulic float control**
  - "Always Full" reservoir
- **Double chamber**
  - Full powered closing
  - Non-slam closing characteristic
  - Protected diaphragm
- **External installation**
  - Easy access to valve and 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

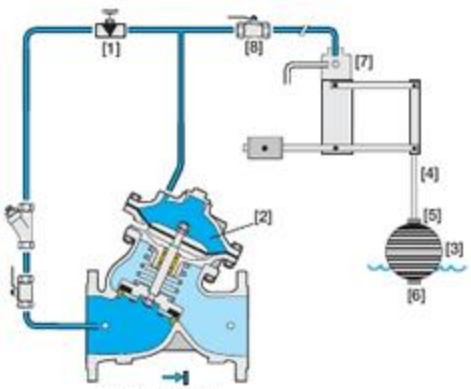
Major Additional Features

- Pressure sustaining – **753-67**
- Electric float backup – **750-67-65**
- Flow control – **757-67-U**
- Level sustaining – **75A-67**

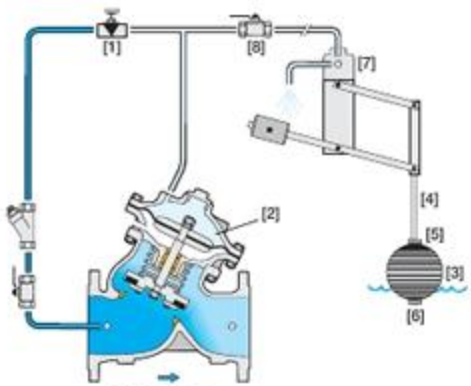
See relevant BERMAD publications.

Operation

The Model 750-67 is a float controlled valve equipped with an adjustable, 2-Way vertical float pilot assembly.
The needle valve **[1]** continuously allows flow from valve inlet into the upper control chamber **[2]**. The float **[3]** is locked on the float assembly rod **[4]** between two adjustable stoppers **[5]** and **[6]**.
Should level rise towards setting, the float pilot **[7]** throttles, pressure in the upper control chamber accumulates causing the main valve to throttle closed, reducing filling rate, and eventually closing drip tight.
Should level fall, the float pilot releases pressure from the upper control chamber causing the main valve to modulate open.
The needle valve controls the closing speed. Cock valve **[8]** enables manual closing.



Valve Closed



Valve Open

Engineer Specifications

The Level Control Valve shall control reservoir filling to maintain constant water level regardless of fluctuating demand.

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 vertical float pilot assembly, 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.

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

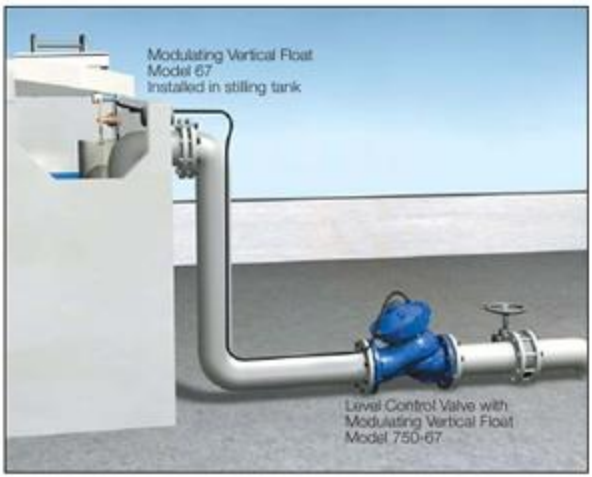
Typical Applications

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 backup protection is recommended. Where system design requires an "always full" rooftop reservoir, the Model 750-67 Modulating Level Control Valve:

- Ensures the reservoir is "always full"
- Closes securely to prevent overflow

Secured closing, even after long periods of the valve being open, is ensured by the fully developed hydraulic closing force associated with the double chamber design.

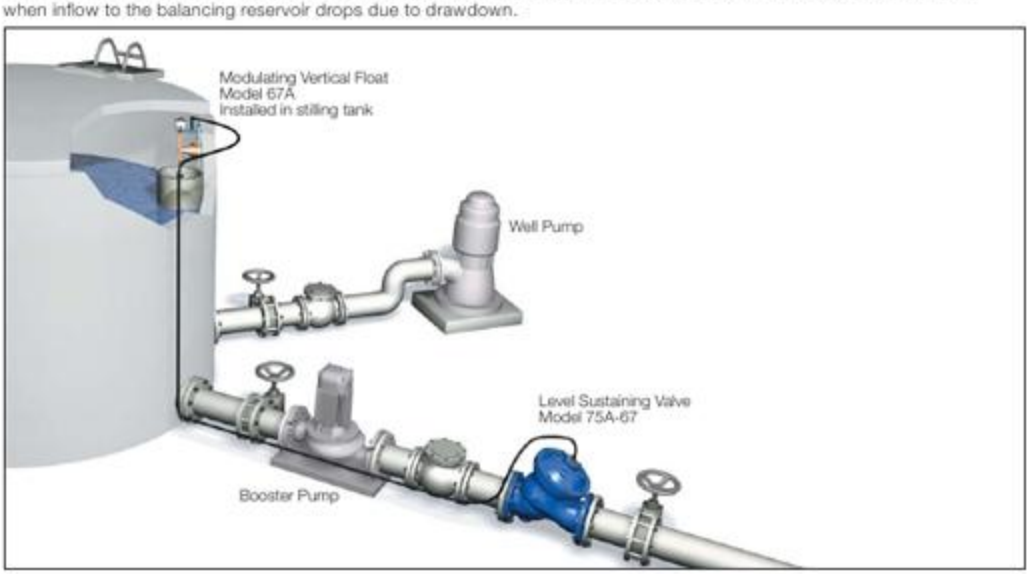


Pump Flow Control According to Balancing Reservoir Level

Where well drawdown effects the inflow to a balancing reservoir and outflow varies according to demand, the booster pump to consumers requires protection against:

- Impeller cavitation
- Pump overload
- Air suction

The Model 75A-67 responds to the balancing reservoir level and provides this protection by dynamically restricting outflow when inflow to the balancing reservoir drops due to drawdown.

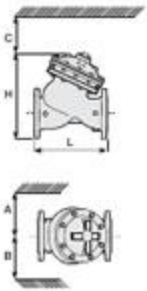


Technical Data

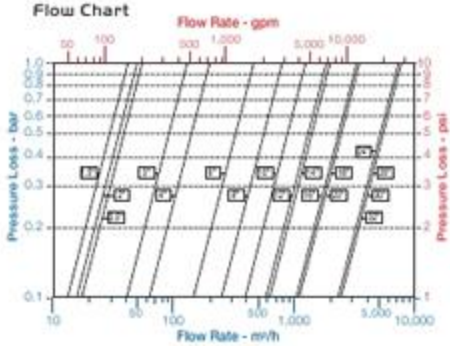
Dimensions and Weights

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	10.8	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	12.8	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 disk valves
For more flow charts, refer to Engineering Section

Main Valve

Valve Patterns: "Y" (globe) & angle
Size Range: 1"/₈-32" (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 Nylon fabric-reinforced
Seals: NBR
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
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Float Standard Materials
Pilot body: Brass
Seals: NBR
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

- Rod length: 54 cm (21")
- Each extension rod adds 56 cm (22"), one extension rod supplied
- Extra counterweight might be required depending on rod length and high operating pressure
- 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	67	-	Y	C	16	EB	-	CB	VI
Waterworks	1½ - 32"	Level Control									

Primary 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

Additional Feature

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

Epoxy FB Blue	EB
Polyester Green	PG
Polyester Blue	PB
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 additional electric control feature is selected

Tubing & Fittings

Copper Tubing & Brass Fittings	CB
Plastic Tubing & 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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Level Control Valve

with Altitude Pilot

- High level reservoirs & water towers
- Energy cost critical systems
- Systems with poor water quality
- Inherent refreshing
- Level sustaining at reservoir outlet

The Model 750-80-X Level Control Valve is a hydraulically controlled, diaphragm actuated control valve that shuts off at pre-set reservoir high level and fully opens in response to an approximately one meter (three foot) level drop, as sensed by the 3-Way altitude pilot mounted on the main valve.

Features and Benefits

- **Line pressure driven** – Independent operation
- **Bi-level altitude pilot**
  - No float, simple installation
  - On/Off service
  - No cavitation damage
  - Suitable for low quality water
  - Reservoir inherent refreshing
- **Double chamber design**
  - Moderated valve reaction
  - Protected diaphragm
- **External installation**
  - Easy access to valve
  - 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

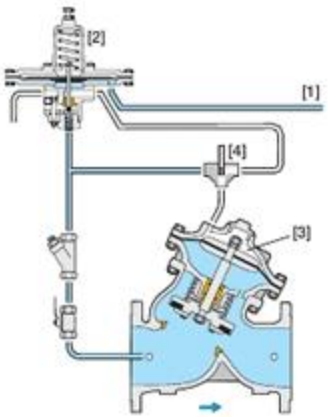
- Modulating altitude control – **750-82**
- Pressure sustaining (for 750-80-X) – **753-80-X**
- Pressure sustaining (for 750-82) – **753-82**
- Bi-directional flow – **750-87-X (780-70-X)**
- Full powered opening & closing – **750-80-B**
- Closing surge prevention – **750-80-49**
- Bi-level altitude control – **750-86**
- Level sustaining with high sensitivity pilot – **75A-83**

See relevant BERMAD publications.

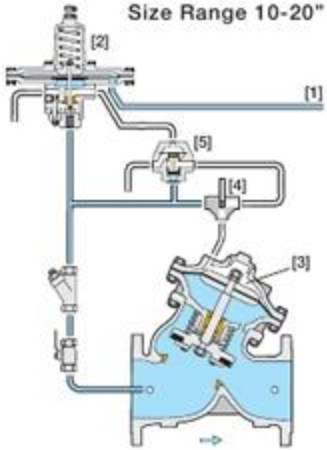
Operation

The Model 750-80-X is a pilot controlled valve equipped with an adjustable, 3-Way altitude pilot. The pilot senses the static head of the reservoir level via a tube **[1]** connected to a "still point" at the bottom of the reservoir.
Should static head rise to pilot setting, the pilot **[2]** applies pressure to the upper control chamber **[3]** via cock valve **[4]**, powering the main valve to shut off.
Should static head fall below pilot setting approximately 1m (3 ft), the pilot vents the upper control chamber, causing the main valve to fully open.
The 3-Way cock valve **[4]** enables manual closing of the main valve.
For 10" valves and larger, an accelerator **[5]** quickens valve response.

Size Range 1½-8"



Size Range 10-20"



Engineer Specifications

The Level Control Valve shall shut off at pre-set reservoir high level and fully open in response to an approximately one meter (three foot) level drop, as sensed by the 3-Way altitude pilot mounted on the main valve.

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.

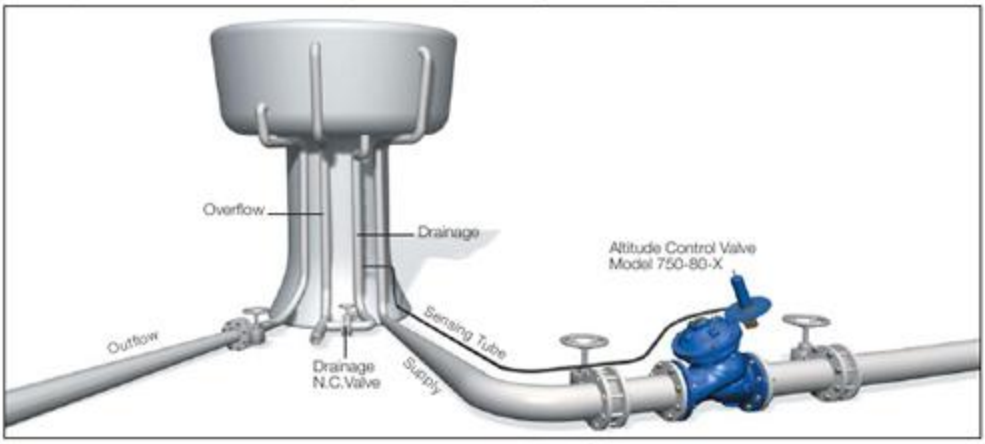
Control System: The control system shall consist of a 3-Way, altitude pilot valve with a covered, centered spring and 8" (200 mm) sensing diaphragm, (for 10" and larger valves, an accelerator shall be added to the solenoid), an isolating cock valve, a 3-way cock valve, and a filter. All fittings shall 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 main valve shall be certified as a complete drinking water valve according to NSF, WRAS, and other recognized standards.

Typical Applications

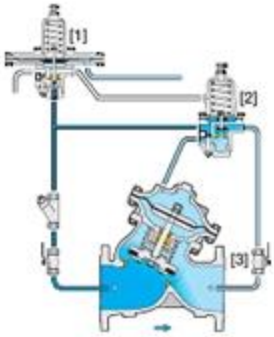
Bi-Level Water Towers

The Model 750-80-X senses the static head of the water level in the tank by means of a high sensitivity pilot. To do so accurately, the sensing tube end must be connected to a "still point" at the bottom of the tank. The drainage pipe provides this "still point", a location not influenced by flow velocity as in filling and outflow pipes.



Level Control and Pressure Sustaining Valve with Altitude Pilot Model 753-80-X

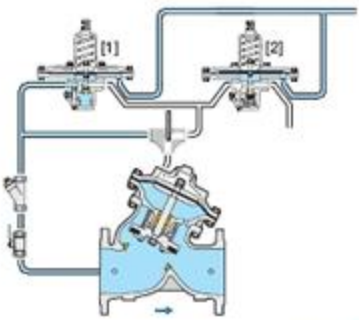
The Model 753-80-X adds the altitude control feature to the Model 730 Pressure Sustaining Valve for applications where prioritizing consumers over reservoir filling is needed. The altitude pilot **[1]** controls the Pressure Sustaining Control Valve by applying pressure to & venting from the pressure sustaining pilot **[2]** sealed spring cell. Should the altitude pilot sense static head at the setting, it applies pressure to the pressure sustaining pilot spring cell, and the main valve closes. The downstream cock valve **[3]** enables manual closing.



Level Control Valve with Bi-Level Altitude Control Model 750-86

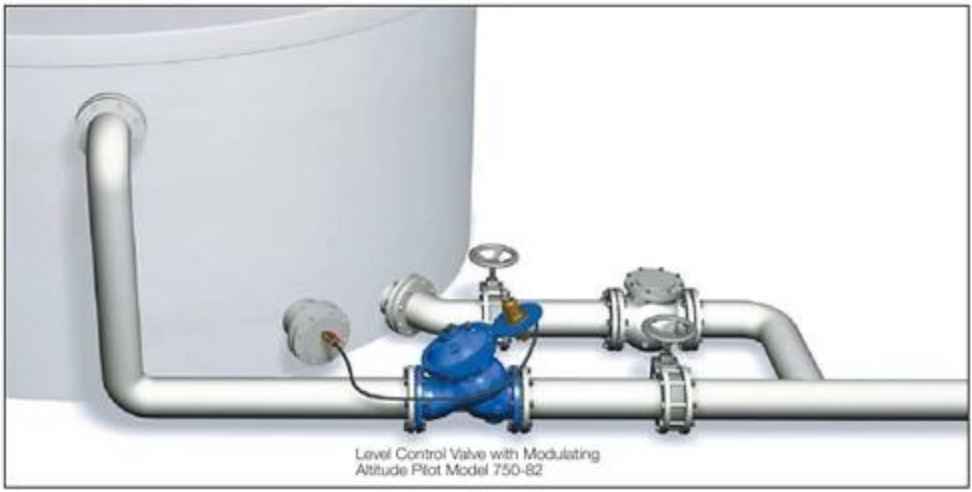
The Model 750-86 adds a low level setting feature to the standard Altitude Control Valve.

A high level pilot **[1]** and a low level pilot **[2]** are adjusted to open at different settings.
Should the static head rise to the closing set point, the high level pilot opens causing the main valve to close.
Should the static head drop to the opening set point, the low level pilot opens causing the main valve to open.
When the level is between pilot settings, both pilots are closed and the main valve remains in its last position.



"Always Full" - Shallow Reservoirs

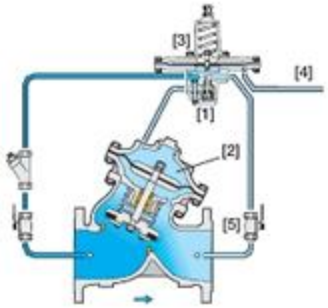
In these reservoirs, the water level should be kept as constant as possible.
The Level Control Valve with modulating altitude pilot Model 750-82 is well suited to fulfill this condition.
The altitude pilot is highly sensitive to changes and accurately maintains level within a few centimeters.
To do so, the sensing tube end must be connected to a "still point" at the bottom of the reservoir.



Level Control Valve with Modulating
Altitude Pilot Model 750-82

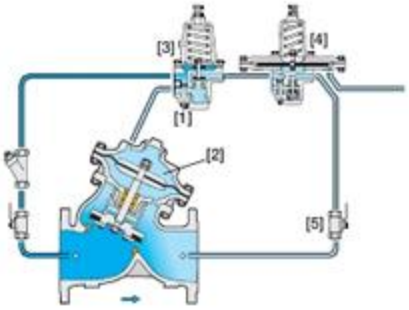
Level Control Valve with Modulating Altitude Pilot Model 750-82

The Model 750-82 modifies the Model 750-80-X "on-off" feature into a modulating feature to maintain an "always full" reservoir.
The needle valve **[1]** continuously allows flow from valve inlet into the upper control chamber **[2]**. The pilot **[3]** senses static head via a sensing tube **[4]**.
Should the static head rise towards pilot setting, the pilot throttles, causing the main valve to throttle closed, reducing filling rate, and eventually closing drip tight. The downstream cock valve **[5]** enables manual control closing.



Adding the Pressure Sustaining Feature Model 753-82

The Model 753-82 combines the modulating altitude control feature with the Model 730 Pressure Sustaining Valve for applications where prioritizing consumers over reservoir filling is needed.
The needle valve **[1]** continuously allows flow from valve inlet into the upper control chamber **[2]**. The pressure sustaining pilot **[3]** and the 2-Way altitude pilot **[4]** control outflow from the upper contro chamber.
When reservoir static head decreases below altitude pilot setting, the main valve modulates open while sustaining pre-set minimum upstream pressure. The downstream cock valve **[5]** enables manual closing.



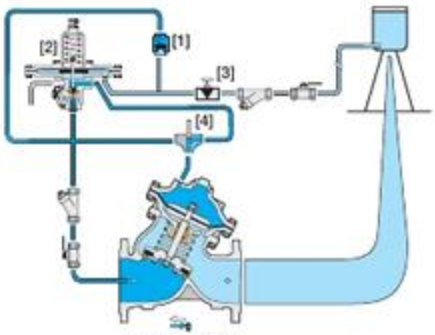
Bi-Directional Flow Level Control Model 750-87-X

The Model 750-87-X modifies the Model 750-80-X to allow bi-directional flow. It saves the need for a line sized, by-pass check valve for reservoirs where the supply line also serves as the outflow line.

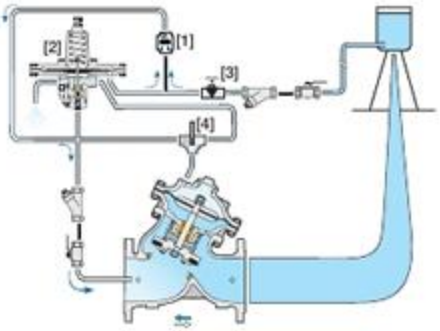
During filling, this valve functions as a standard Model 750-80-X, while the control check valve **[1]** prevents upstream pressure from entering the pilot **[2]** sensing chamber.

Should upstream pressure fall below reservoir static head, the pilot senses "false" low static head, due to the restricted flow released to valve inlet, through the needle valve **[3]**, and the check valve **[1]** The pilot then opens the main valve allowing reverse flow from the reservoir.

The 3-Way cock valve **[4]** enables manual closing of the main valve.



Valve Closed



Reservoir Feeding

Level Sustaining Valve at Reservoir Outlet Model 75A-83

The Model 75A-83 is an altitude pilot controlled valve designed to maintain minimum reservoir volume.

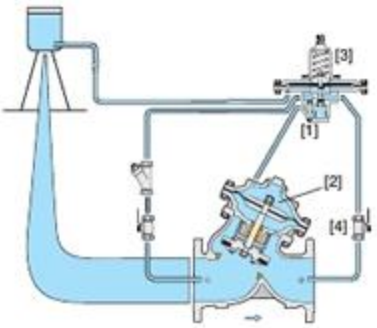
The needle valve **[1]** continuously allows flow from valve inlet into the upper control chamber **[2]**. The pilot **[3]** senses static head from a "still-point" at the bottom of the resrvoir.

Should this head decrease towards pilot setting, the pilot throttles, enabling pressure to accumulate in the upper control chamber causing the main valve to throttle closed and restrict outflow, and eventually close to maintain minimum level.

When reservoir level rises above pilot setting, the pilot releases accumulated pressure from the upper control chamber causing the main valve to modulate open.

To ensure adequate operating pressure, the valve must be positioned sufficiently below the reservoir bottom.

The downstream cock valve **[4]** enables manual closing.



BERMAD Waterworks

700 Series

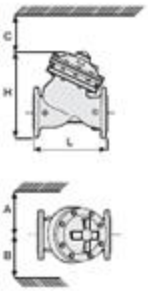
Model 750-80-X

Technical Data

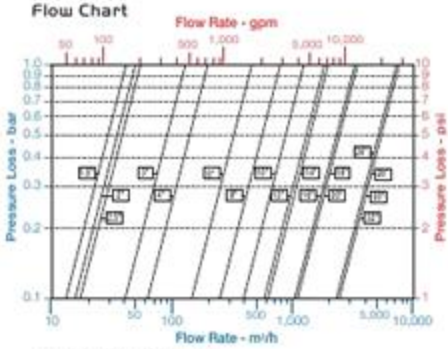
Dimensions and Weights

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"	478	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"	648	26	965	38	990	39.0	1106	43.6	848	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 disk 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 15 0, 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 Nylon fabric-reinforced
Seals: NBR
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
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Pilot Standard Materials:
Body & cover: Brass, Bronze or Stainless Steel
Elastomers: NBR
Springs: Galvanized Steel or Stainless Steel
Internals: Stainless Steel
Diaphragm covers: Fusion bonded epoxy coated Steel or Stainless Steel

Altitude Adjustment Range

Code	meter	feet
M6	2-14	7-46
M5	5-22	17-72
M4	15-35	49-115
M8	25-70	82-230

- Shut-off level repeatability: 10 cm (4")
- Re-opening level: approx. 1m (3 ft) below shut-off level

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	80	M6	Y	C	16	EB	–	CB	XI
Waterworks	1½" - 32"	Level Control									

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

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

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

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

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 additional electric control feature is selected

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

3-Way Control Loop	X
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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Level Control and Pressure Sustaining Valve

with Bi-Level Electric Float

- Reservoir level control
- Prioritizing consumers over reservoir filling
- Backup for reservoir supply valves

The Model 753-65 Level Control and Pressure Sustaining Valve with Bi-Level Electric Float is a hydraulically operated diaphragm actuated control valve that controls reservoir filling in response to an electric signal. The valve opens at pre-set low level and shuts off at pre-set high level.
During filling, it sustains minimum upstream pressure, regardless of fluctuating flow or reservoir level.

Features and Benefits

- **Line pressure driven** – Independent operation
- **Bi-Level electric float switch**
  - On/off service
  - Low cavitation damage
  - No hydraulic sensing tubes
  - Simplified float installation and setting
  - Reservoir inherent refreshing
- **Solenoid controlled**
  - Low power consumption
  - Normally Open or Normally Closed main valve
- **Double chamber**
  - Moderated valve reaction
  - Protected diaphragm
- **In-line serviceable** – Easy maintenance
- **Flexible design** – Easy addition of features
- **Balanced seal disk** – High relief flow capacity

Major Additional Features

- Hydraulic float backup – **753-65-66**
- Altitude pilot backup – **753-65-80**
- Closing surge prevention – **753-65-49**
- Electrically selected multi-level settings – **753-65-45**

See relevant BERMAD publications.

Operation

The Model 753-65 is a pilot controlled valve equipped with an adjustable, 2-Way pressure sustaining pilot, a solenoid pilot* and an electric float switch.**

The float switch **[1]** closes at pre-set low level to energize the solenoid **[2]** and opens at pre-set high level to de-energize the solenoid. The needle valve **[3]** continuously allows flow from the valve inlet into the upper control chamber **[4]**. The pressure sustaining pilot **[5]**, set to minimum allowed system pressure, senses upstream pressure, and together with the solenoid pilot **[2]**, controls outflow from the upper control chamber.

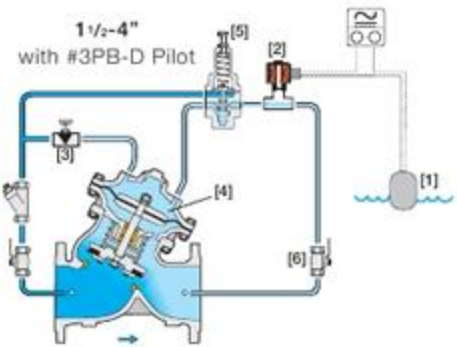
At high level, the solenoid closes causing the main valve to shut off.

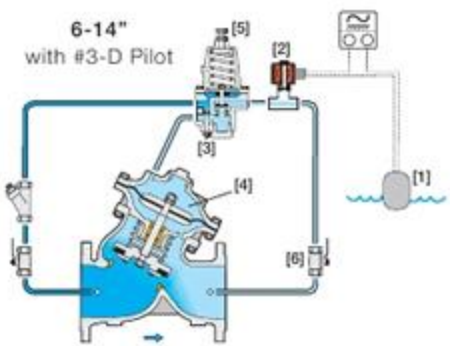
At low level, the solenoid opens leaving the pressure sustaining pilot to modulate the main valve open while sustaining minimum upstream pre-set pressure.

The needle valve controls the closing speed. The downstream cock valve **[6]** enables manual closing.

* Normally Closed, Normally Open and Last Position main valves are available.

** Other switching means are available.





Note: For 16" and larger valves, see "Pilot Valve Selection" table at the last page of Model 730.

Engineer Specifications

The Level Control and Pressure Sustaining Valve shall control reservoir filling in response to an electric signal, opening at pre-set low level and shutting off at pre-set high level. During filling, it shall sustain minimum upstream pressure, regardless of fluctuating flow or reservoir level.

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.

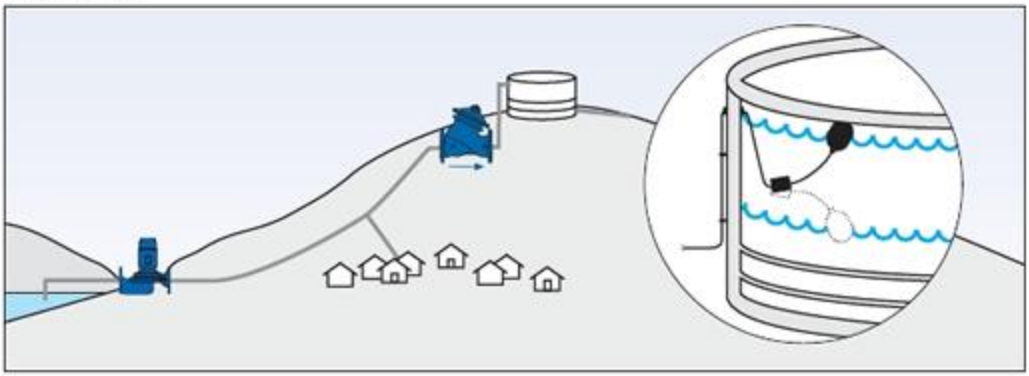
Control System: The control system shall consist of a 2-Way adjustable, direct acting pressure sustaining pilot valve, a solenoid pilot, a needle valve, isolating cock valves, a filter, and an electric float switch. All fittings shall be forged brass or stainless steel. The assembled valve shall be hydraulically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

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

Typical Applications

Level Control and Pressure Sustaining

In this elevated reservoir system, pressure to consumers is prioritized over reservoir filling by adding the pressure sustaining feature to the Model 750-65 Level Control Valve, thereby modifying it to become the Model 753-65 Level Control and Pressure Sustaining Valve.



Typical Installation

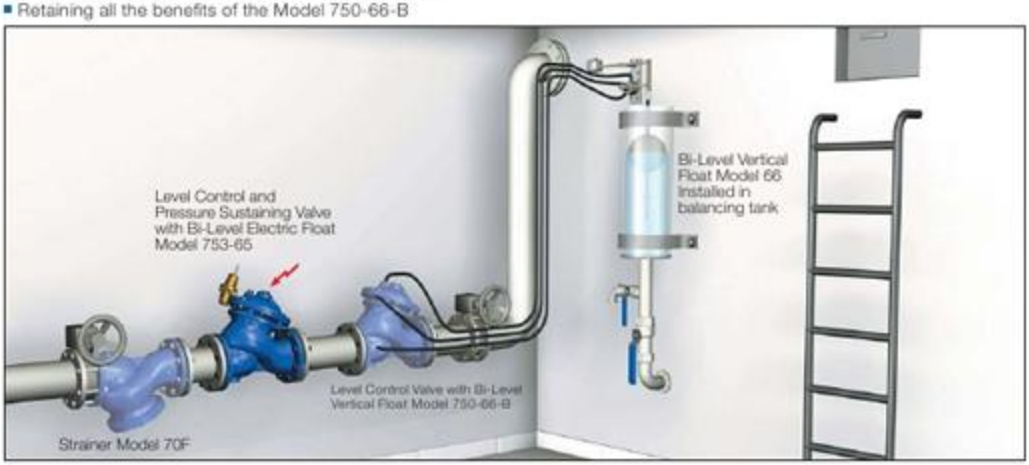
Basement reservoirs in high-rise building

Excellent reservoir level control is achieved by installing BERMAD's Model 750-66-B due to these features:

- On/off service
- Full powered opening & closing
- Low throttling noise
- Non-slam closing characteristic

When prioritizing consumers over reservoir filling is required, rather than adding the pressure sustaining feature to the Model 750-66-B, BERMAD recommends installing a Model 753-65, Normally Open, Level Control and Pressure Sustaining Valve with Bi-Level Electric Float. This enables:

- Adding the required pressure sustaining feature
- Ensuring full backup by a "second line" of protection
- Retaining all the benefits of the Model 750-66-B



BERMAD Waterworks

700 Series

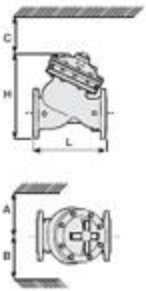
Model 753-65

Technical Data

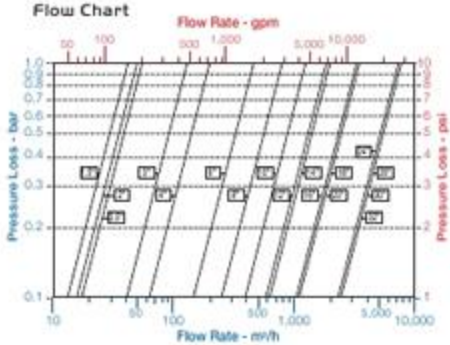
Dimensions and Weights

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 disk valves
For more flow charts, refer to Engineering Section

Main Valve

Valve Patterns: "Y" (globe) & angle
Size Range: 1"/₂–32" (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 Nylon fabric-reinforced
Seals: NBR
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
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Solenoid Standard Materials:
Body: Brass or Stainless Steel
Elastomers: NBR, EPDM or FPM
Enclosure: Molded epoxy
Solenoid Electrical Data:
Voltages:
(ac): 24, 110-120, 220-240, (50-60 Hz)
(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

Sustaining Pilot Standard Materials:
Body: Brass, Bronze or Stainless Steel
Elastomers: NBR
Springs: Galvanized Steel or Stainless Steel
Internals: Stainless Steel
Float switch
Max. Current: 16A@250V
Fluid specific weight: 0.95-1.10
Working temperature:
Water up to 60°C (140°F)
Dimensions: Length – 124 mm (4.9")
Width – 90 mm (3.5")
Cable length – 4.9 m (16 ft.)

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"	753	65	-	Y	C	16	EB	4AC	CB	I

Sector
Waterworks: WW

Size
1½ - 32": [size]

Primary Feature
Level Control and Pressure Sustaining: 753

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

Epoxy FB Blue	EB
Polyester Green	PG
Polyester Blue	PB
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

Tubing & Fittings

Copper Tubing & Brass Fittings	CB
Plastic Tubing & 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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Level Control and Pressure Sustaining Valve

with Bi-Level Vertical Float

- Reservoir level control
- Prioritizing consumers over reservoir filling
- Backup for reservoir supply valves

The Model 753-66 Level Control and Pressure Sustaining Valve with Bi-Level Vertical Float is a hydraulically operated, diaphragm actuated control valve that controls reservoir filling, opening at pre-set reservoir low level and shutting off at pre-set high level. During filling, it sustains minimum upstream pressure regardless of fluctuating flow or reservoir level.

Features and Benefits

- **Line pressure driven** – Independent operation
- **Bi-Level hydraulic float control**
  - On/off service
  - Low cavitation damage
  - Inherent reservoir refreshing
- **Double chamber design**
  - Moderated valve reaction
  - Non-slam closing characteristic
  - Protected diaphragm
- **External installation**
  - Easy access to valve and float
  - Easy level setting
  - Less wear and tear
- **In-line serviceable** – Easy maintenance
- **Flexible design** – Easy addition of features
- **Balanced seal disk** – High relief flow capacity

Major Additional Features

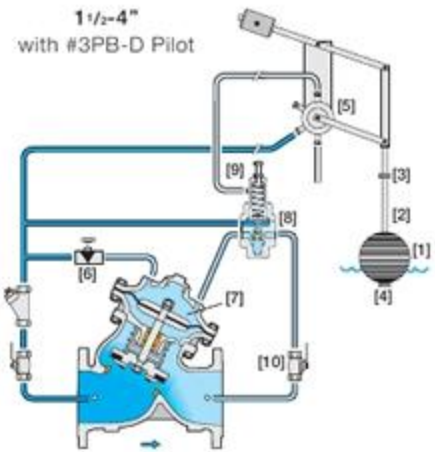
- Electric float backup – **753-66-65**
- Altitude pilot backup – **753-66-80**
- Closing surge prevention – **753-66-49**

See relevant BERMAD publications.

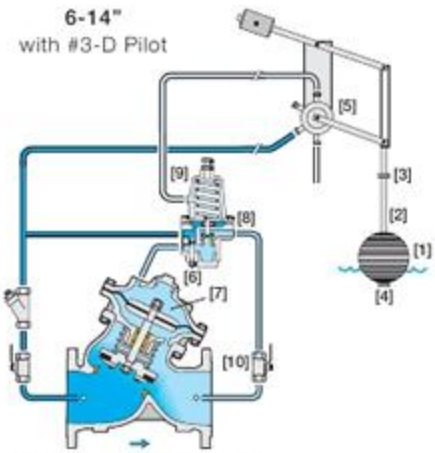
Operation

The Model 753-66 is a float and pilot controlled valve.
The float **[1]** slides along the rod **[2]**. When the float reaches either the adjustable high **[3]** or low **[4]** level stoppers, it either pushes the rod assembly up or pulls it down, switching the float pilot **[5]** position. When the float is between the adjustable stoppers, the main valve remains in its last position. The needle valve **[6]** continuously allows flow from valve inlet into the upper control chamber **[7]**. The pressure sustaining pilot **[8]**, set to minimum allowed system pressure, senses upstream pressure and accordingly controls outflow from the upper control chamber.
At high level, the float pilot applies pressure to the pressure sustaining pilot spring cell **[9]**, shutting off outflow from the upper control chamber. Thus causes the main valve to close.
At low level, the float pilot vents the pressure sustaining pilot spring cell allowing the main valve to modulate open while sustaining minimum upstream pre-set pressure.
The needle valve controls the closing speed. The downstream cock valve **[10]** enables manual closing.

1¹/₂-4"
with #3PB-D Pilot



6-14"
with #3-D Pilot



Note: For 16" and larger valves, see "Pilot Valve Selection" table at the last page of Model 730.

Engineer Specifications

The Level Control and Pressure Sustaining Valve shall control reservoir filling, opening at pre-set reservoir low level and shutting off at pre-set high level. During filling, it shall sustain minimum upstream pressure regardless of fluctuating flow or reservoir level.

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.

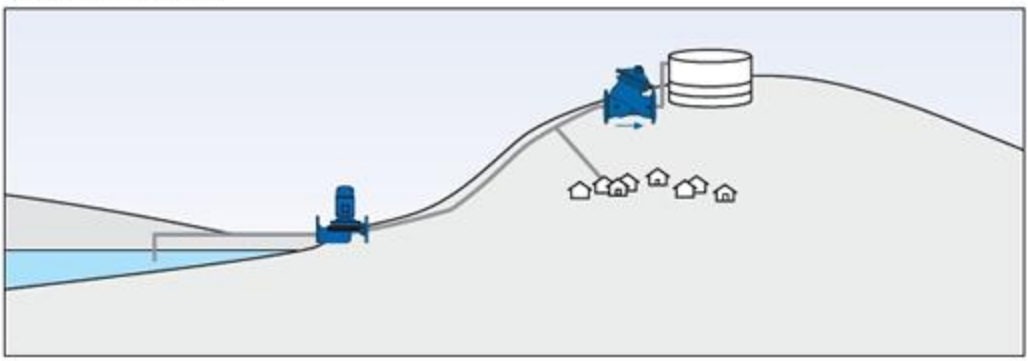
Control System: The control system shall consist of a 4-Way, "Last Position", adjustable bi-level, hydraulic vertical float, an adjustable, direct acting, 2-Way pressure sustaining pilot valve, a needle valve, isolating cock valves, and a filter. All fittings shall be forged brass or stainless steel. 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 main valve shall be certified as a complete drinking water valve according to NSF, WRAS, and other recognized standards.

Typical Applications

Level Control and Pressure Sustaining

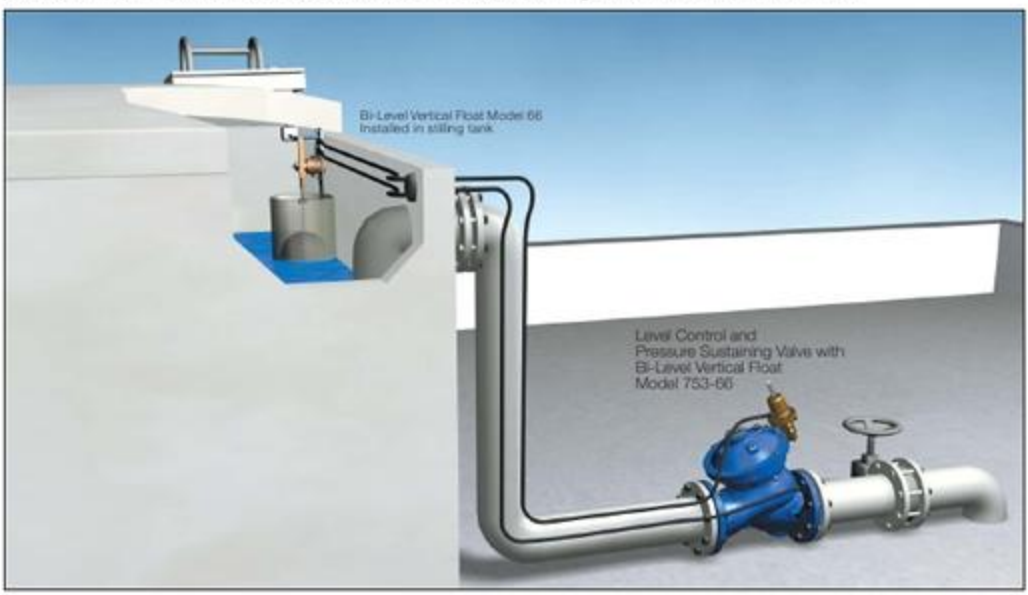
In this elevated reservoir system, pressure to consumers is prioritized over reservoir filling by adding the pressure sustaining feature to the Model 750-66-B Level Control Valve thereby, modifying it to become the Model 753-66 Level Control and Pressure Sustaining Valve.



Typical Installation

Rooftop in high-rise building

Rooftop reservoir level control is attained by electric control of the basement pumps. As overflow of a rooftop reservoir can cause costly damage, on-site hydraulic backup protection is recommended.
To prioritize pressure for upper floor consumers or a fire protection system, while ensuring fail-safe overflow protection, install the Model 753-66 Level Control & Pressure Sustaining Valve with Bi-Level Vertical Float.

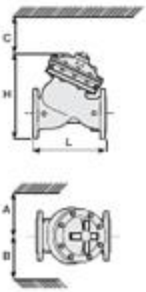


Technical Data

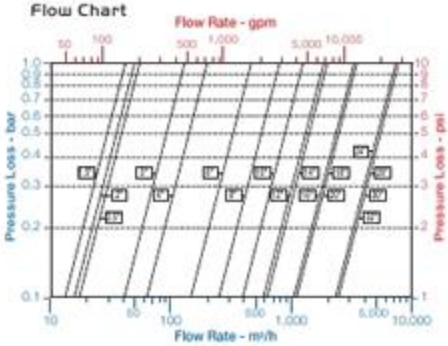
Dimensions and Weights

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	10.8	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	840	1863
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 disk valves
For more flow charts, refer to Engineering Section

Main Valve

Valve Patterns: "Y" (globe) & angle
Size Range: 1"/₈-32" (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 Nylon fabric-reinforced
Seals: NBR
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
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Sustaining Pilot Standard Materials:
Body: Brass, Bronze or Stainless Steel
Elastomers: NBR
Springs: Galvanized Steel or Stainless Steel
Inner trim: 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

Float Assembly Technical Data:

- 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"	753	66	–	Y	C	16	EB	–	CB	VI
Waterworks	1⅛ - 32"	Level Control and Pressure Sustaining			Oblique (up to 20°) Y Angle (up to 18°) A Globe (24-32" only) G	Ductile Iron Standard C Cast Steel S St. Steel 316 N Nickel Alumin. Bronze U	Epoxy FB Blue EB Polyester Green PG Polyester Blue PB Uncoated UC		Copper Tubing & Brass Fittings CB Plastic Tubing & Brass Fittings PB St. St. 316 Tubing & Fittings NN	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
		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				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			
		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					Use when additional electric control feature is selected		Multiple choices permitted		

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Level and Flow Control Valve

with Bi-Level Vertical Float

- Reservoir level control
- Prioritizing consumers over reservoir filling
- Backup for reservoir supply valves
- Integral valve cavitation protection

The Model 757-66-U Level and Flow Control Valve with Bi-Level Vertical Float is a hydraulically operated, diaphragm actuated control valve that controls reservoir filling. The valve hydraulically opens at pre-set low level and shuts off at pre-set high level. During filling, it limits the flow to preset maximum, regardless of fluctuating upstream pressure or reservoir level.

Features and Benefits

- **Line pressure driven** – Independent operation
- **Bi-Level hydraulic float control**
  - On/Off service
  - Low cavitation damage
  - Reservoir inherent refreshing
- **Hydraulic flow sensor (downstream installation)**
  - No moving parts
  - No electronic components
  - Wide flow setting range
  - Cavitation damage protection
- **Double chamber design**
  - Moderated valve reaction
  - Protected diaphragm
- **External installation**
  - Easy access to valve and float
  - Easy level setting
- **In-line serviceable** – Easy maintenance
- **Flexible design** – Easy addition of features

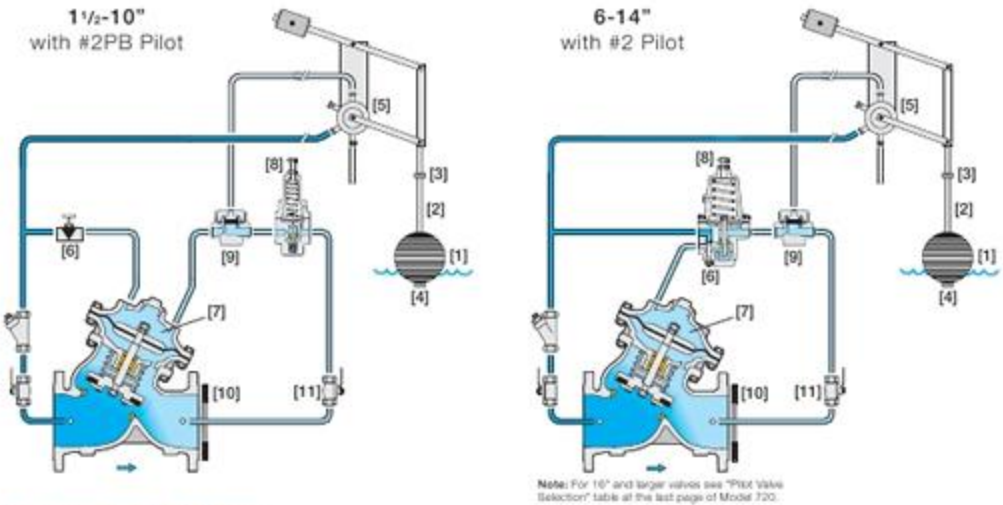
Major Additional Features

- Closing surge prevention – **757-66-49-U**
- Hydraulic float backup – **757-66-65-U**
- Altitude pilot backup – **757-66-80-U**

See relevant BERMAD publications.

Operation

The Model 757-66-U is a float and pilot controlled valve.
The float **[1]** slides along the rod **[2]**. When the float reaches either the adjustable high **[3]** or low **[4]** level stoppers, it either pushes the rod assembly up or pulls it down, switching the float pilot **[5]** position. When the float is between the adjustable stoppers, the main valve remains in its last position. The needle valve **[6]** continuously allows flow from valve inlet into the upper control chamber **[7]**. The Pressure Reducing (PR) pilot **[8]**, and the Hydraulic Relay Valve (HRV) **[9]**, together control outflow from the upper control chamber.
At high level, the float pilot applies pressure to the HRV control chamber closing it and causing the main valve to shut off.
At low level, the HRV opens, leaving the PR pilot to modulate the main valve open according to orifice **[10]** upstream pressure. Should this pressure rise above pilot setting, the PR pilot throttles, causing the main valve to throttle closed. Orifice upstream pressure is reduced to pilot setting, limiting the flow.
The needle valve controls the closing speed. The downstream cock valve **[11]** enables manual closing.



Note: For 16" and larger valves see "Pilot Valve Selection" table at the last page of Model 720.

Engineer Specifications

The Level & Flow Control Valve with Bi-Level Vertical Float shall control reservoir filling, opening at pre-set low level and shutting off at pre-set high level. During filling, it shall limit the flow to pre-set maximum regardless of fluctuating upstream pressure or reservoir level.

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, vertical float, a 2-Way adjustable direct acting pressure reducing pilot valve, a hydraulic relay valve, a needle valve, isolating cock valves, a filter, and a stainless steel downstream orifice plate. 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 main valve shall be certified as a complete drinking water valve according to NSF, WRAS, and other recognized standards.

Typical Applications

Gravity Fed Lines

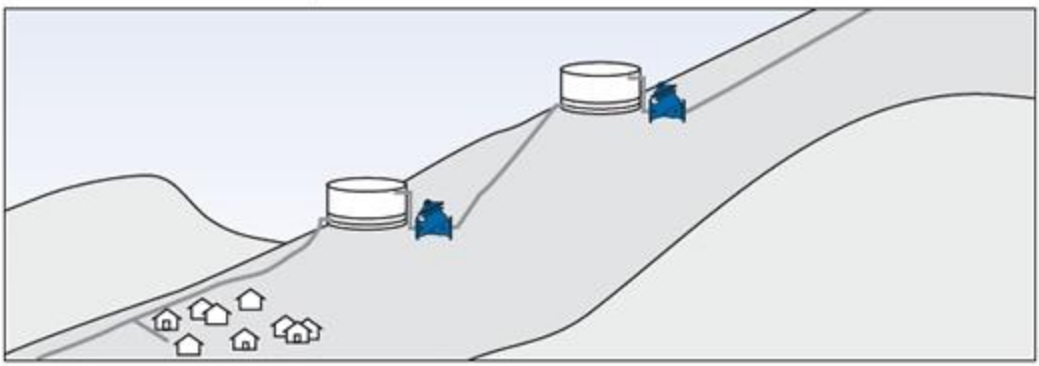
Alternative solutions to accommodate the obvious pressure reducing requirements associated with high elevation differential pipelines are:

- Pressure-reducing valves in series (see BERMAD's publication: Proportional Pressure Reducing Valve, Model 720-PD)
- Sequential pressure breaking reservoirs

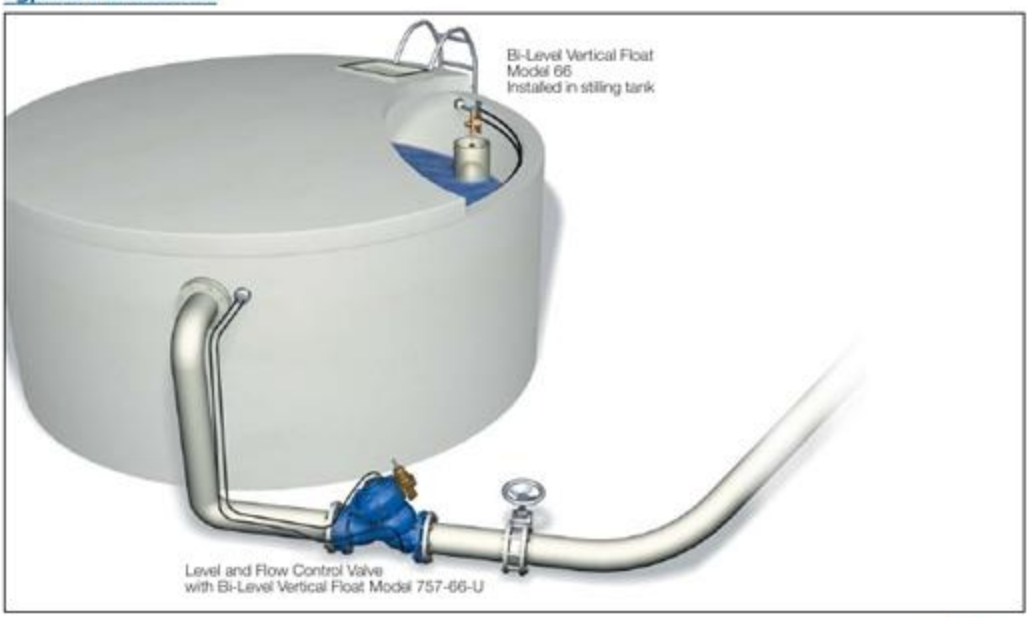
Where pressure breaking reservoirs already exist or are specified, some issues to consider are:

- Pipeline problems associated with line emptying and filling
- Valve cavitation damage
- Reservoir high pressure flow jets

The Model 757-66-U is well suited to provide the solutions to these issues.



Typical Installation



BERMAD Waterworks

700 Series

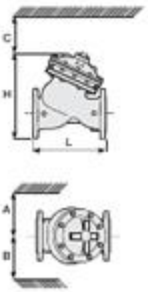
Model 757-66-U

Technical Data

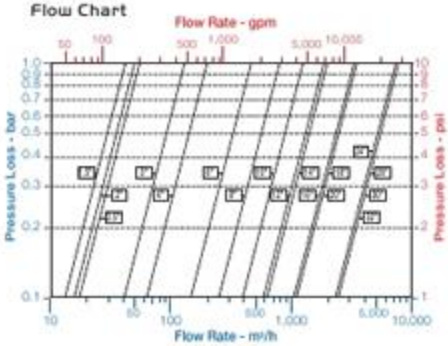
Dimensions and Weights

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	840	1863
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

The orifice plate adds 5-12 mm to valves length according to valves size.
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 disk valves
For more flow charts, refer to Engineering Section

Main Valve

Valve Patterns: "Y" (globe) & angle
Size Range: 1"/₂–32" (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 Nylon fabric-reinforced
Seals: NBR
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
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Sustaining Pilot Standard Materials:
Body: Brass, Bronze or Stainless Steel
Elastomers: NBR
Springs: Galvanized Steel or Stainless Steel
Internals: Stainless Steel
Float Standard Materials
Pilot body: Brass
Seals: NBR
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

Float Assembly Technical Data:
- 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

Orifice Plate: Stainless Steel
- O.D machined according to flange standard
- I.D. machined according to required flow rate

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"	757	66	–	Y	C	16	EB	–	CB	UI

Waterworks | 1½ - 32" | Level and Flow Control

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

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

Epoxy FB Blue	EB
Polyester Green	PG
Polyester Blue	PB
Uncoated	UC
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 additional electric control feature is selected

Copper Tubing & Brass Fittings	CB
Plastic Tubing & Brass Fittings	PB
St. St. 316 Tubing & Fittings	NN
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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PCRW657-68U '08

Hydraulic Non-Slam Check Valve

With Opening & Closing Speed Control

- Pump check valve
- One-way zone isolation
- Return flow prevention
- Surge elimination

The Model 760-03-V Hydraulic Non-Slam Check Valve is a double chambered, hydraulically operated, diaphragm actuated control valve which is hydraulically powered to fully open during system flow when upstream pressure exceeds downstream pressure. If pressure conditions reverse, the valve gradually shuts off drip tight preventing back flow.

Features and Benefits

- **Line-pressure driven** – Independent operation
- **Double chamber**
  - Powered opening and closing
  - Moderated valve reaction
  - Protected diaphragm
- **Opening and closing speed control** – Eliminates system surges
- **Balanced seal disk** – High flow capacity
- **In-line serviceable** – Easy maintenance
- **Flexible design** – Easy addition of features
- **"Y" or angle, wide body** – Minimal pressure loss
- **Semi-straight flow** – Non-turbulent flow
- **Obstacle free, full bore** – Uncompromising reliability
- **V-Port Throttling Plug** – Smooth closing characteristics

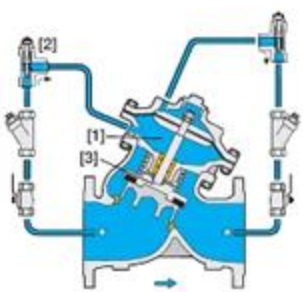
Major Additional Features

- Valve position indicator – **760-03-VI**
- Electric limit switch – **760-03-VS**
- Pressure sustaining & check valve – **730-23-V**
- Flow control & check valve – **770-23-UV**
- Pressure reducing & check valve – **720-23-V**

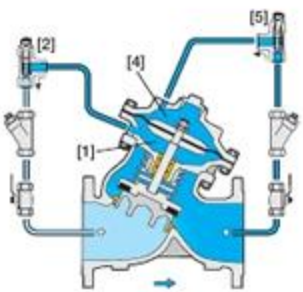
See relevant BERMAD publications.

Operation

The Model 760-03-V is a double chambered, hydraulically operated, diaphragm actuated control valve that operates independently of valve differential pressure.
During flow conditions, the higher upstream pressure is applied to the lower control chamber **[1]** through the "free-flow" direction of a One-Way Flow Control **[2]**. This opening force coupled with the upstream pressure exerted on the bottom-side of the seal disk **[3]** powerfully opens the valve.
Should pressure conditions reverse, the greater downstream pressure is applied to the upper control chamber **[4]** through the "free-flow" direction of another One-Way Flow Control **[5]**. This develops closing force that is coupled to the forces being applied to the top-side of the seal disk by the reversed flow and the actuator spring, and causes the valve to positively close, sealing drip tight. The pressure released from the lower chamber **[1]**, through the One-Way Flow Control **[2]** restriction, provides cushioning for a smooth non-slam closing.
Both the opening and closing speeds can be adjusted by the flow controls.



Valve Open



Valve Closing

Engineer Specifications

The Non-Slam Hydraulic Check Valve shall be powered open during flow conditions by the superior upstream pressure. When downstream pressure exceeds upstream pressure, the check valve shall gradually shut off drip tight, preventing back flow. Both the opening and closing speeds shall be adjustable.

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 a sealed 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 One-Way Flow Controls, isolating cock valves and two filters. All fittings shall be forged brass or stainless steel. The assembled valve shall be hydraulically tested to customer requirements.

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

Typical Applications

Pump Check Valve

In this system, a pump battery supplies the main line through a manifold.
The Model 760-03-V installed downstream from each pump:

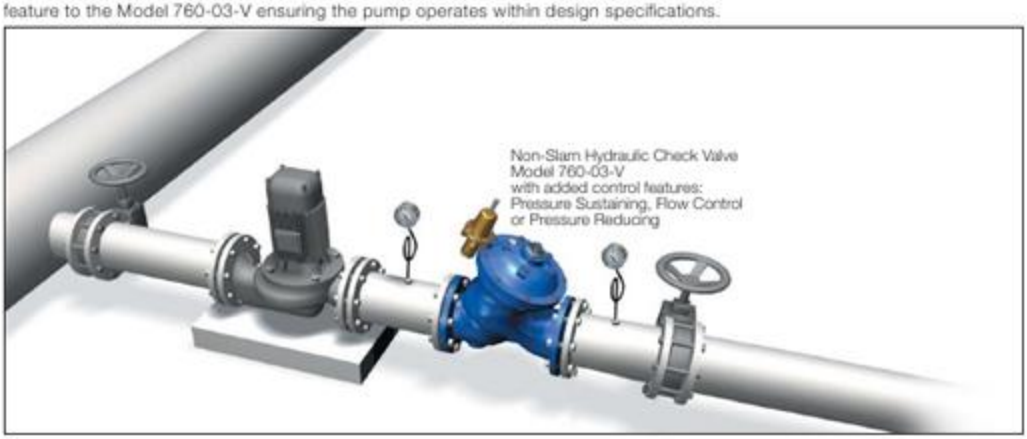
- Prevents reverse flow from damaging pump
- Provides smooth starting and stopping of supplementary pumps
- Allows surge-free switching between "on-duty" pumps
- Delays reaction of variable speed primary pump to single speed supplementary pump going on line or off line.

Pump Overload and Cavitation Protection

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 and cavitation damage. The Model 730-23-V adds a pressure sustaining feature to the Model 760-03-V ensuring the pump operates within design specifications.



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 770-23-UV, adds a flow limiting feature to the Model 760-03-V.

700 Series

Model 760-03-V

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
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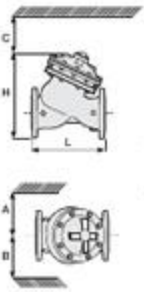
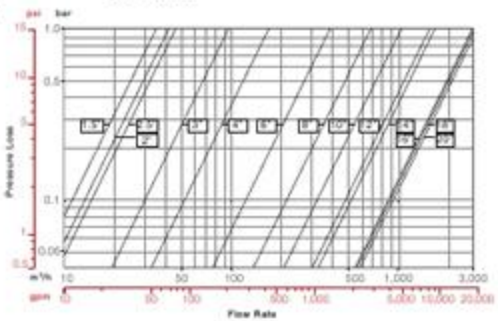
200	8"	475	19	460	18	500	19.7	584	23.0	125	276
250	10"	520	21	580	23	605	23.8	724	28.5	217	478
300	12"	545	22	685	27	725	28.5	840	33.1	370	816
350	14"	545	22	685	27	733	28.9	866	34.1	381	840
400	16"	645	26	965	38	990	39.0	1108	43.6	846	1866
450	18"	645	26	965	38	1000	39.4	1127	44.4	945	2083
500	20"	645	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, throttling plug (U-Type) valves
For more flow charts, refer to Engineering Section

Main Valve

Valve Patterns: "Y" (globe) & angle
Size Range: 1½–20" (40-500 mm)
For sizes 24-32"; 600-800 mm, Consult BERMAD
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 Nylon fabric-reinforced
Seals: NBR

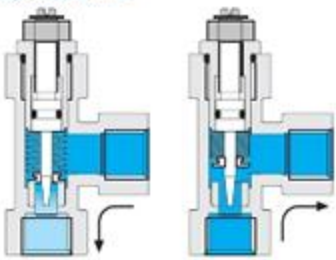
Coating:
Fusion Bonded Epoxy, RAL 5005 (Blue)
NSF & WRAS approved or Electrostatic Polyester Powder, RAL 6017 (Green)

Control System

Standard Materials:
Accessories:
Bronze, Brass, Stainless Steel & NBR
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel

One-Way Flow Control

Operation Modes



"Restriction" direction

"free-flow" direction

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"	760	03	Y	C	16	EB	–	CB	VI

Sector		Size		Primary Feature		Additional Feature		Pattern		Body Material		End Connections		Coating		Voltage & Position		Tubing & Fittings		Additonal Attributes	
Waterworks	WW	1½ - 20"	6"	Hydraulic Non-Slam Check Valve	760	Opening and Closing Speed Control	03	Oblique (up to 20°)	Y	Ductile Iron Standard	C	ISO-16	16	Epoxy FB Blue	EB	Copper Tubing & Brass Fittings	CB	V-Port Throttling Plug	V
								Angle (up to 18°)	A	Cast Steel	S	ISO-25	25	Polyester Green	PG	St. St. 316 Tubing & Fittings	NN	Valve Position Indicator	I
								Globe (24-32" only)	G	St. Steel 316	N	ANSI-150	A5	Polyester Blue	PB	Plastic Tubing & Brass Fittings	PB	Electric Limit Switch	S
										Nickel Alumin. Bronze	U	ANSI-300	A3	Uncoated	UC			St. St. 316 Control Accessories	N
												JIS-16	J6					St. St. 316 Internal Trim (Closure & Seat)	T
												JIS-20	J2					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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Flow Control Valve

with Solenoid Control

- Limiting consumers over demand
- Controlling pipeline fill rate
- Pump overload & cavitation protection
- Switching between "on-duty" valves
- Selecting system flow regime

The Model 770-55-U Flow Control Valve with Solenoid Control is a hydraulically operated, diaphragm actuated control valve that maintains preset maximum flow, regardless of fluctuating demand or varying system pressure. The valve opens and shuts off in response to an electric signal.

Features and Benefits

- **Line pressure driven** – Independent operation
- **Hydraulic flow sensor (upstream installation)**
  - No moving parts
  - No electronic components
  - No need for flow straightening
- **Solenoid controlled**
  - Low power consumption
  - Wide ranges of pressure and voltages
  - Normally Open, Normally Closed or Last Position
- **In-line serviceable** – Easy maintenance
- **Double chamber design**
  - Moderated valve reaction
  - Protected diaphragm
- **Semi-straight flow** – Non-turbulent flow
- **Stainless Steel raised seat** – Cavitation damage resistant
- **Obstacle free, full bore** – Uncompromising reliability
- **V-Port Throttling Plug** – Low flow stability

Major Additional Features

- Flow control (constant downstream pressure) – **727-U**
- Solenoid control & check feature – **770-25-U**
- High sensitivity pilot – **770-55-12-U**
- Pressure Reducing – **772-U**
- Electric override – **770-59-U**
- Level & flow control valve – **757-U**
- Pump & flow control valve – **747-U**
- Electronic control valve – **718-03**

See relevant BERMAD publications.

Operation

The Model 770-55-U is a pilot controlled valve equipped with an adjustable, 2-Way flow pilot, an orifice assembly, and a solenoid pilot.

The needle valve **[1]** continuously allows flow from valve inlet into the upper control chamber **[2]**. The pilot **[3]** senses the differential pressure across the orifice plate **[4]**, and together with the solenoid **[5]**, controls outflow from the upper control chamber.

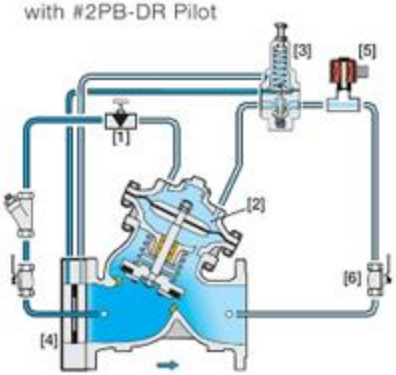
Should orifice differential pressure rise above pilot setting, the pilot throttles, enabling pressure to accumulate in the upper control chamber, causing the main valve to throttle closed, thereby limiting flow to the pilot setting.

Should orifice differential pressure fall below pilot setting, the pilot releases accumulated pressure causing the main valve to modulate open.

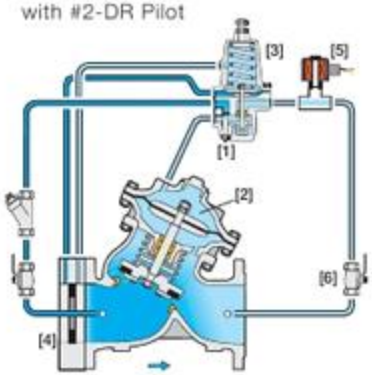
Should the solenoid close, pressure in the upper control chamber accumulates causing the main valve to shut off. Normally Closed, Normally Open and Last Position models are available.

The needle valve controls the closing speed. The downstream cock valve **[6]** enables manual closing.

1 1/2-4"
with #2PB-DR Pilot



6-14"
with #2-DR Pilot



Note: For 16" and larger valves, see "Pilot Valve Selection" table at the last page of Model 770-U.

Engineer Specifications

The Flow Control Valve shall maintain pre-set maximum flow, regardless of fluctuating demand or varying system pressure and shall open or shut off in response to an electric signal.

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 flow pilot valve, an orifice plate, a 2-Way solenoid pilot, a needle valve, isolating cock valves, and a filter. The orifice shall be attached to main valve inlet. All fittings shall be forged brass or stainless steel. The assembled valve shall be hydraulically tested and factory adjusted to customer requirements.

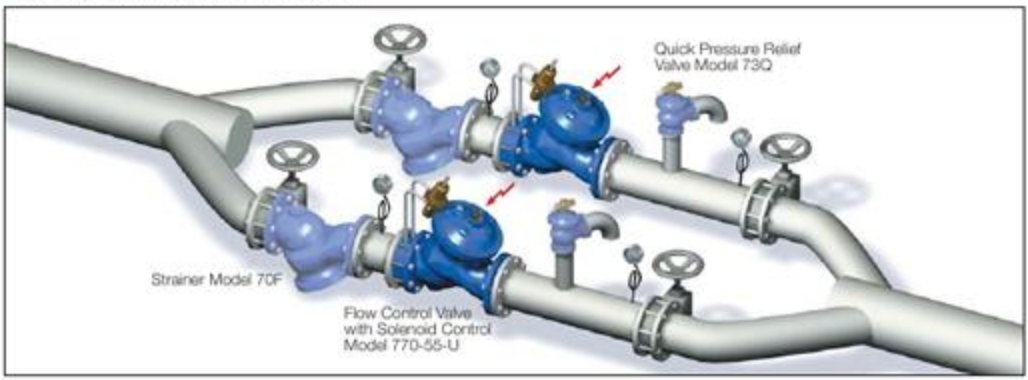
Quality Assurance: The valve manufacturer shall be certified according to the ISO 9001 Quality Assurance Standard. The main valve shall be certified as a complete drinking water valve according to NSF, WRAS, and other recognized standards.

Typical Applications

Parallel Valve Installation

In a distribution network, there is often a need to respond to several flow regimes. In flow control valves, the orifice limits the valve adjustment range to about ±15%. Parallel installation of two Model 770-55-U valves enable:

- Flow limiting for various flow regimes
- Equalizing operating hours between valves

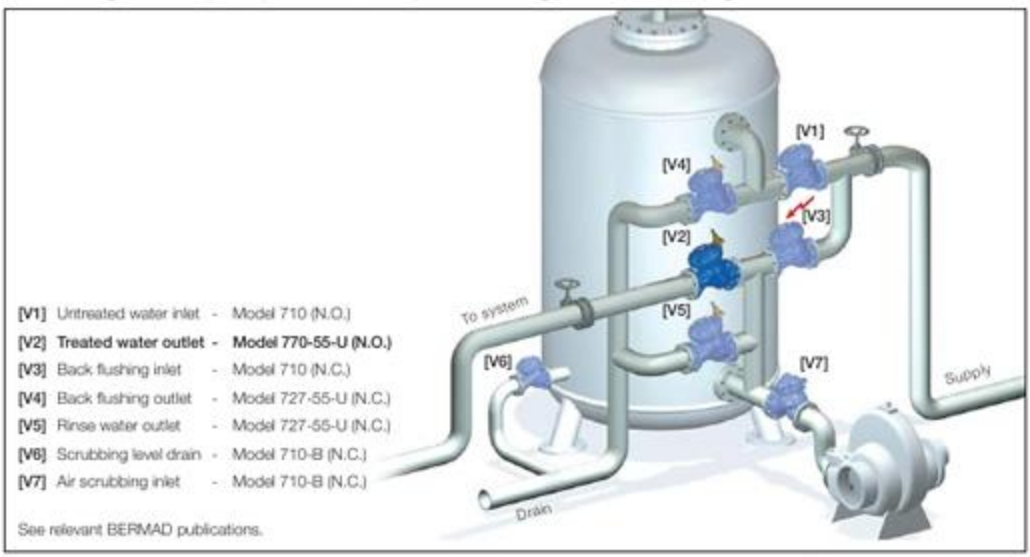


Filtration Systems

In a filter battery, installed as part of a water treatment system, excessive flow through any of the filters might cause:

- Unequal filter loading and blocking
- Reduced filter efficiency
- Structural damage to the filter element

The Model 770-55-U **[V2]** maintains the pre-set maximum flow through each of the filters. The solenoid control enables disconnecting each filter (in turn) from the filtration process allowing periodic back flushing.



[V1]	Untreated water inlet	- Model 710 (N.O.)
[V2]	**Treated water outlet**	- **Model 770-55-U (N.O.)**
[V3]	Back flushing inlet	- Model 710 (N.C.)
[V4]	Back flushing outlet	- Model 727-55-U (N.C.)
[V5]	Rinse water outlet	- Model 727-55-U (N.C.)
[V6]	Scrubbing level drain	- Model 710-B (N.C.)
[V7]	Air scrubbing inlet	- Model 710-B (N.C.)

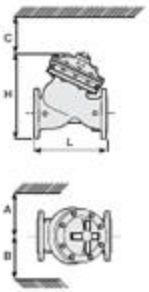
See relevant BERMAD publications.

Technical Data

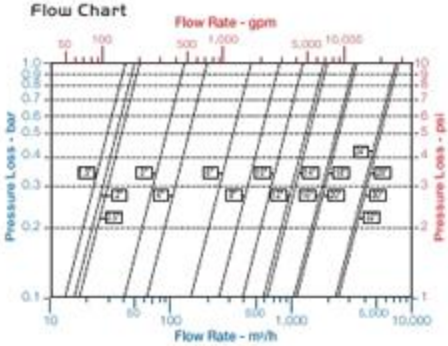
Dimensions and Weights

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	10.8	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	840	1863
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

The orifice assembly adds 20 mm to valve length.
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 disk 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 Nylon fabric-reinforced
Seals: NBR
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
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Pilot Standard Materials:
Body: Brass, Bronze or Stainless Steel
Elastomers: NBR
Springs: Galvanized Steel or Stainless Steel
Internals: Stainless Steel

- For "Flow Pilot Valve Selection" table, refer to the Model 770-U.
- When minimum head loss is essential and flow velocity is higher than 1.0 m/sec, consider using the Model 770-j equipped with a pilot tube flow sensor and high sensitivity flow pilot #7.

Solenoid Standard Materials:
Body: Brass or Stainless Steel
Elastomers: NBR or FPM
Enclosure: Molded epoxy
Solenoid Electrical Data:
Voltages:
(ac): 24, 110-120, 220-240, (50-60 Hz)
(dc): 12, 24, 110, 220
Power Consumption:
(ac): 30 VA, inrush; 15 VA (BW), holding or 70 VA, inrush; 40 VA (17.1W), holding
(dc): 8-11.6W
Values might vary according to specific solenoid model

Orifice Assembly Standard Materials:
Body: Fusion bonded epoxy Steel or Stainless Steel
Orifice Plate: Stainless Steel
Sensing Ports: ¼" NPT
- Standard (calculated) differential pressure: 0.4 bar (5.5 psi)

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"	770	55	Y	C	16	EB	4AC	CB	UI

Waterworks	1½ - 32"	Flow Control		Oblique (up to 20°) Y Angle (up to 18°) A Globe (24-32" only) G		Epoxy FB Blue EB Polyester Green PG Polyester Blue PB Uncoated UC			Copper Tubing & Brass Fittings CB Plastic Tubing & Brass Fittings PB St. St. 316 Tubing & Fittings NN	
				Ductile Iron Standard C Cast Steel S St. Steel 316 N Nickel Alumin. Bronze U						Valve Position Indicator I Large Control Filter F Orifice Assembly U V-Port Throttling Plug V Electric Limit Switch S 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 Pilot Tube I
			No Additional Feature 00 Closing and Opening Speed-Control 03 High sensitivity pilot 12 Check Valve 20 Solenoid Controlled & Check Valve 25 Hydraulic Control 50 Solenoid Controlled 55 Electric Override 59		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			

Multiple choices permitted

Multiple choices permitted

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Flow Control Valve

- Prioritizing main system over sub-system
- Limiting consumers over demand
- Controlling pipeline fill rate
- Pump overload & cavitation protection

The Model 770-U Flow Control Valve is a hydraulically operated, diaphragm actuated control valve that maintains pre-set maximum flow, regardless of fluctuating demand or varying system pressure.

Features and Benefits

- **Line pressure driven** – Independent operation
- **Hydraulic flow sensor (upstream installation)**
  - No moving parts
  - No electronic components
  - No need for flow straightening
- **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
- **Stainless Steel raised seat** – Cavitation damage resistant
- **Obstacle free, full bore** – Uncompromising reliability
- **V-Port Throttling Plug** – Low flow stability

Major Additional Features

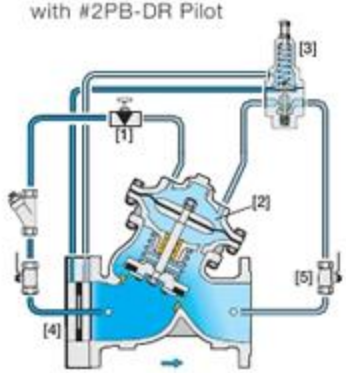
- Solenoid control – **770-55-U**
- Solenoid control & check feature – **770-25-U**
- High sensitivity pilot – **770-12-U**
- Pressure Reducing – **772-U**
- Level & flow control valve – **757-U**
- Pump & flow control valve – **747-U**
- Pump circulation & flow control valve – **749-U**
- Electronic control valve – **718-03**

See relevant BERMAD publications.

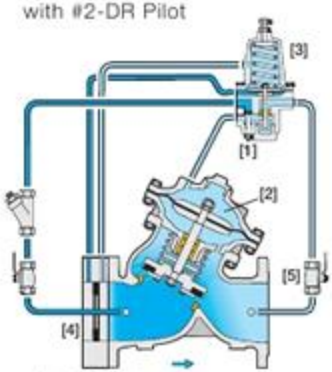
Operation

The Model 770-U is a pilot controlled valve equipped with an adjustable, 2-Way flow pilot and an orifice assembly.
The needle valve **[1]** continuously allows flow from valve inlet into the upper control chamber **[2]**. The pilot **[3]** senses the differential pressure across the orifice plate **[4]**. Should this differential pressure rise above pilot setting, the pilot throttles, enabling pressure to accumulate in the upper control chamber, causing the main valve to throttle closed, and limiting flow to the pilot setting. Should orifice differential pressure fall below 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 **[5]** enables manual closing.

1½-4"
with #2PB-DR Pilot



6-14"
with #2-DR Pilot



Note: For 16" and larger valves, see "Flow Pilot Valve Selection" table at the last page.

Engineer Specifications

The Flow Control Valve shall maintain pre-set maximum flow, regardless of fluctuating demand or varying 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 a 2-Way adjustable, direct acting flow pilot valve, an orifice plate, a needle valve, isolating cock valves, and a filter. The orifice shall be attached to main valve inlet. 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 main valve shall be certified as a complete drinking water valve according to NSF, WRAS, and other recognized standards.

Typical Applications

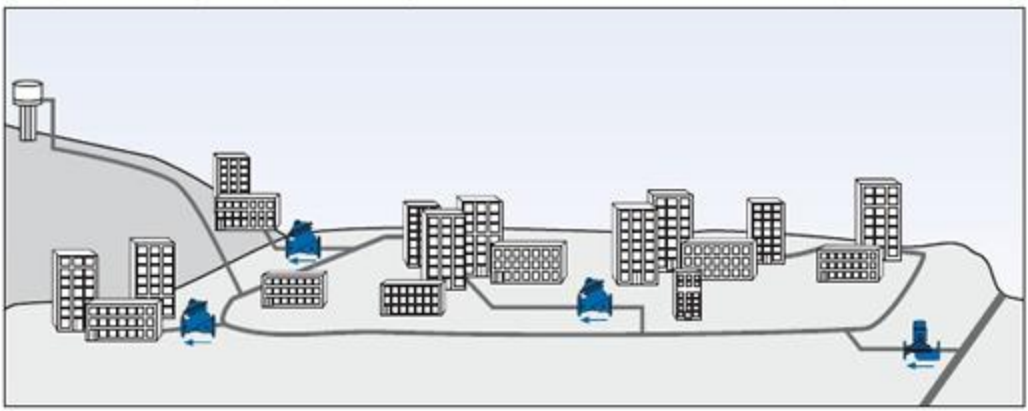
Distribution Networks

System design starts from expected flow range that determines major system components:

- Pump stations: Characteristics, location, quantity
- Supply lines: Layout, class, size
- Reservoirs: Location, volume, head

Significant deviation from designed flow range might disrupt water supply or even damage system components. Appropriate design, placement, and use of the Model 770-U protects the system from excessive flow.

When pressure reducing is also required, choosing the Model 772-U, instead of the Model 770-U, completes the solution.



Pump Overload and Cavitation Protection

Protection against excessive demand that causes pump overload and cavitation damage, is achieved by sustaining pump flow within design specifications.

Since pump specifications vary, so do the required solutions:

- When the pump curve (flow vs. ΔP) is relatively steep, pressure sustaining valves Models 730, 730R, and 736 are the most suitable.
- When the pump curve is relatively flat, pump protection with respect to pressure is not sufficient. Protection according to flow is recommended. The Model 770-U is the most suitable.

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
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250	10"	520	21	580	23	605	23.8	724	28.5	217	478
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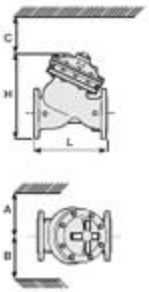
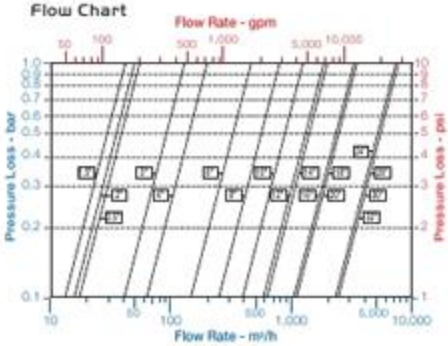
500	20"	645	26	965	38	1100	43.3	1167	45.9	962	2121

The orifice assembly adds 20 mm to valve length.
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 disk 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 Nylon fabric-reinforced
Seals: NBR
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
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Pilot Standard Materials:
Body: Brass, Bronze or Stainless Steel
Elastomers: NBR
Springs: Galvanized Steel or Stainless Steel
Internals: Stainless Steel
Orifice Assembly Standard Materials:
Body: Fusion bonded epoxy Steel or Stainless Steel
Orifice Plate: Stainless Steel
Sensing Ports: ⅛" NPT

- Standard (calculated) differential pressure: 0.4 bar (5.5 psi)

Flow Pilot Valve Selection

Valve Size	Pilot Type		
	#2PB-DR	#2- DR	#2HC-DR
1½-4" 40-100 mm	■		
6-14" 150-350 mm		■	
16 -32" 400-800 mm			■

- Pilots are modified to differential remote sensing-model "DR".
- When minimum head loss is essential and flow velocity is higher than 1.0 m/sec, consider using the Model 770-j equipped with a pitot tube flow sensor and high sensitivity flow pilot #7.

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"	770	00	Y	C	16	EB	–	CB	UI

Waterworks — 1½ - 32" — Flow Control

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	
Epoxy FB Blue	EB
Polyester Green	PG
Polyester Blue	PB
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 additional electric control feature is selected

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

Additonal Attributes	
Valve Position Indicator	I
Large Control Filter	F
Orifice Assembly	U
V-Port Throttling Plug	V
Electric Limit Switch	S
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
Pilot Tube	j

Additional Feature	
No Additional Feature	00
Closing and Opening Speed-Control	03
High sensitivity pilot	12
Check Valve	20
Solenoid Controlled & Check Valve	25
Hydraulic Control	50
Solenoid Controlled	55
Electric Override	59

Multiple choices permitted

Multiple choices permitted

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Flow Control and Pressure Reducing Valve

- Controlling over demand & pressure
- Balancing flow via parallel pressure reducing valves
- Controlling pipeline fill rate
- Pump cavitation & system over pressure protection
- Compensating during groundwater drawdown

The Model 772-U Flow Control and Pressure Reducing Valve is a hydraulically operated, diaphragm actuated control valve with two independent functions. It maintains both pre-set maximum flow and reduces higher upstream pressure to lower constant downstream pressure, regardless of varying demand or upstream pressure.

Features and Benefits

- **Line pressure driven** – Independent operation
- **Hydraulic flow sensor (upstream installation)**
  - No moving parts
  - No electronic components
  - No need for flow straightening
- **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
- **Stainless Steel raised seat** – Cavitation damage resistant
- **Obstacle free, full bore** – Uncompromising reliability
- **V-Port Throttling Plug** – Low flow stability

Major Additional Features

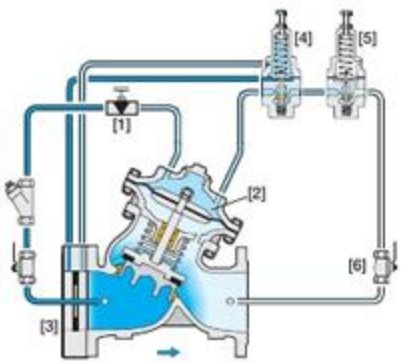
- Solenoid control – **772-55-U**
- Check feature – **772-20-U**
- Solenoid control & check feature – **772-25-U**
- Downstream over pressure guard – **772-48-U**

See relevant BERMAD publications.

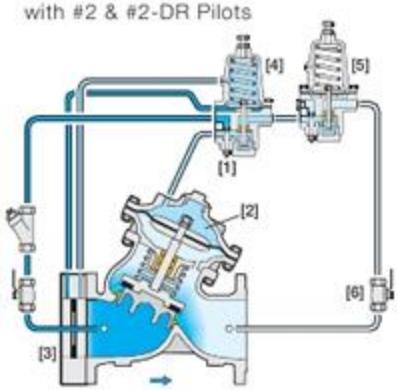
Operation

The Model 772-U is a pilot controlled valve equipped with an orifice assembly and two adjustable, 2-Way pilots for Flow Control (FC) and Pressure Reducing (PR), operating independently in series.
The needle valve **[1]** continuously allows flow from valve inlet into the upper control chamber **[2]**.
Should orifice plate **[3]** differential pressure rise above FC pilot **[4]** setting, the pilot throttles causing pressure to accumulate in the upper control chamber. The main valve throttles closed maintaining maximum flow at pilot setting.
Should this differential pressure fall below FC pilot setting, the pilot releases accumulated pressure to the main valve outlet through the held open PR pilot **[5]** causing the main valve to modulate open.
Should opening the main valve cause downstream pressure to rise above PR pilot setting, the pilot closes, causing the main valve to throttle closed, reducing downstream pressure.
The needle valve controls the closing speed. The downstream cock valve **[6]** enables manual closing.

1½-4"
with #2PB & #2PB-DR Pilots



6-14"
with #2 & #2-DR Pilots



Note: For 16" and larger valves, refer to the relevant notes at the last page.

Engineer Specifications

The Flow Control and Pressure Reducing Valve shall maintain both pre-set maximum flow and reduce higher upstream pressure to lower constant downstream pressure, regardless of varying demand or 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.

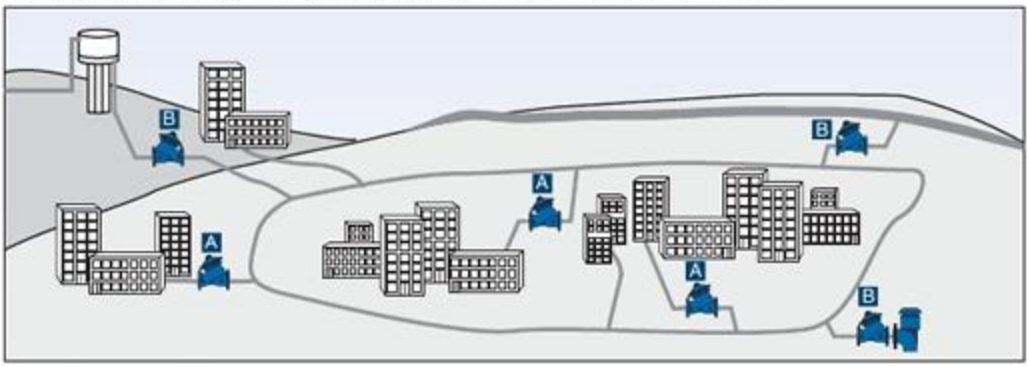
Control System: The control system shall consist of a 2-Way adjustable direct acting flow pilot valve, an adjustable direct acting pressure reducing pilot valve, an orifice plate, a needle valve, isolating cock valves, and a filter. The orifice shall be attached to the main valve inlet. All fittings 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 main valve shall be certified as a complete drinking water valve according to NSF, WRAS, and other recognized standards.

Typical Applications

Distribution Networks

The Model 772-U synergizes the advantages of flow control and pressure-reducing in one valve.



Better than Just Flow Control

System design starts from expected flow range that determines major system components:

- Pump stations: Characteristics, location, quantity
- Supply lines: Layout, class, size
- Reservoirs: Location, volume, head

Significant deviation from designed flow range might disrupt water supply or even damage system components. Appropriate design, placement, and use of the Model 770-U protects the system from excessive flow.

When pressure reducing is also required, choosing the Model 772-U **[A systems]**, instead of the Model 770-U, completes the solution.

Better than Just Pressure Reducing

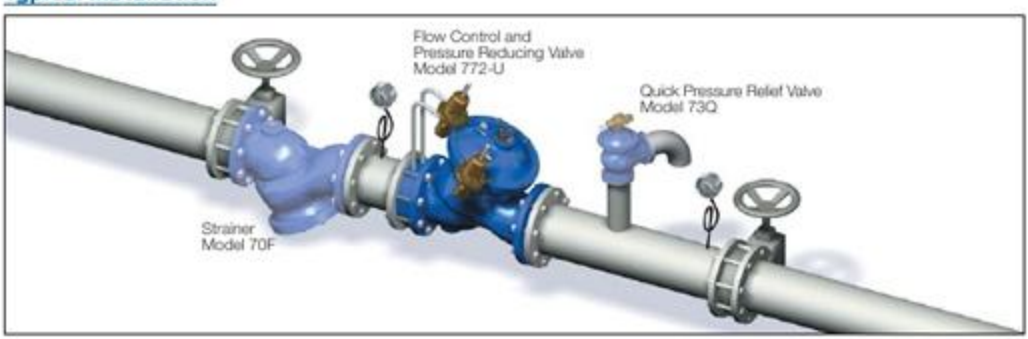
Where multiple sources with various pressures feed into a common network, multiple pressure reducing valves are installed to control network pressure. Their pressure settings are adjusted so that valves progressively "step-in" and "step-out" resulting in the minimum number of valves of the smallest size operating at any time.

Where downstream pressure (as with the Model 720) is the only controlled characteristic, flow through any of the valves might rise above recommended values to damage the valves and cause each "step" to be fuzzy.

The Model 772-U **[B systems]** limits flow through each valve resulting in:

- Protection against excessive flow cavitation damage
- Sharp valve "step-in" and "step-out"

Typical Installation

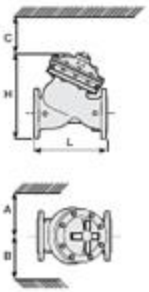


Technical Data

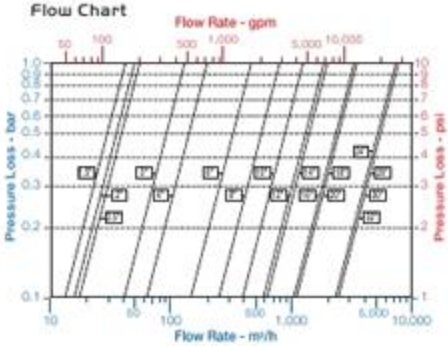
Dimensions and Weights

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	10.5	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	840	1863
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

The orifice assembly adds 20 mm to valve length.
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 disk 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 Nylon fabric-reinforced
Seals: NBR
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
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Pilot Standard Materials:
Body: Brass, Bronze or Stainless Steel
Elastomers: NBR
Springs: Galvanized Steel or Stainless Steel
Internals: Stainless Steel

- For Flow Pilot Valve Selection table, refer to the Model 770-U.
- For pressure reducing "Pilot Valve Selection" refer to the Model 720.

Orifice Assembly Standard Materials:
Body: Fusion bonded epoxy Steel or Stainless Steel
Orifice Plate: Stainless Steel
Sensing Ports: ½" NPT

- Standard (calculated) differential pressure: 0.4 bar (5.5 psi)
- When minimum head loss is essential and flow velocity is higher than 1.0 m/sec, consider using the Model 770-j equipped with a pitot tube flow sensor and high sensitivity flow pilot #7.

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"	772	00	Y	C	16	EB	–	CB	UVI

Waterworks — 1½ - 32" — Flow Control and Pressure Reducin

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

Additional Feature	
No Additional Feature	00
Closing and Opening Speed-Control	03
Check Valve	20
Solenoid Controlled & Check Valve	25
Hydraulic Control	50
Solenoid Controlled	55
Electric Override	59

Multiple choices permitted

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 additional electric control feature is selected

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

Additonal Attributes	
Valve Position Indicator	I
Large Control Filter	F
Orifice Assembly	U
V-Port Throttling Plug	V
Electric Limit Switch	S
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
Pilot Tube	J

Multiple choices permitted

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Burst Control Valve

Excessive Flow

- Zone shut off at burst
  - "Older" burst susceptible networks
  - Outlets from reservoir at earthquake risk
  - Vulnerable network infrastructure facilities
  - Networks at risk of mechanical damage

The Model 790-M Burst Control Valve is a hydraulically operated, diaphragm actuated control valve that upon sensing flow in excess of setting shuts off and locks drip tight, until it is manually reset. As long as flow is lower than the setting, the valve remains fully open, minimizing head loss.

Features and Benefits

- **Line pressure driven** – Independent operation
- **Mechanical flow stem**
  - Field adjustable
  - No moving parts
  - No electronic components
- **Highly sensitive hydraulic pilot**
  - Requires minimal valve-ΔP
  - Tight setting window
- **In-line serviceable** – Easy maintenance
- **Double chamber**
  - Moderated valve reaction
  - Protected diaphragm
  - No spring - Full opening
- **Flexible design** – Easy addition of features
- **"Y" or angle, wide body** – Minimized pressure loss
- **Obstacle free, full bore** – Uncompromising reliability

Major Additional Features

- Closing at pressure drop – **790-91**
- Pressure reducing – **792-U**
- Solenoid control – **790-55-M**
- Electric override – **790-59-M**

See relevant BERMAD publications.

Operation

The Model 790-M is a pilot controlled valve equipped with an adjustable, 2-Way, high sensitivity, differential pressure sustaining pilot.

The pilot **[1]**, senses valve differential pressure.

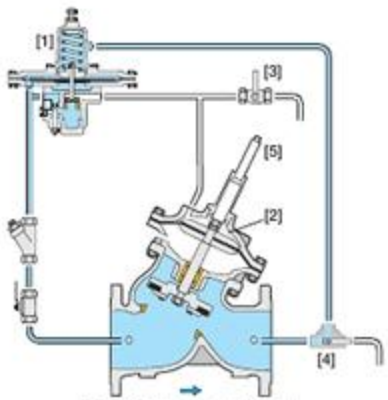
Should that pressure rise above pilot setting, the pilot opens, introducing upstream pressure into the upper control chamber **[2]**, causing the main valve to begin an irreversible "close & lock" process.

Opening and resetting the main valve requires manual intervention by means of the manual reset valve **[3]**.

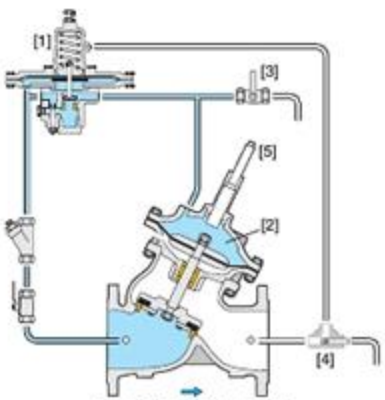
When differential pressure is below pilot setting, the pilot blocks upstream pressure from the control chamber, and the main valve remains fully open.

The manual test valve **[4]** enables simulation of burst conditions and valve response. After testing, reset procedure is required.

The mechanical flow stem **[5]** enables adjusting the closing point, to meet various flow regimes.



Valve Open (normal flow)



Valve Closed & Locked

Engineer Specifications

Upon sensing flow in excess of setting, the Burst Control Valve shall shut off and lock drip tight until it is manually reset. As long as flow is lower than the setting, the valve shall remain fully open, minimizing head loss.

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 actuator assembly shall not contain any closing spring or spring like device. 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, differential pressure sustaining pilot valve, a mechanical flow stem, 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 main valve shall be certified as a complete drinking water valve according to NSF, WRAS, and other recognized standards.

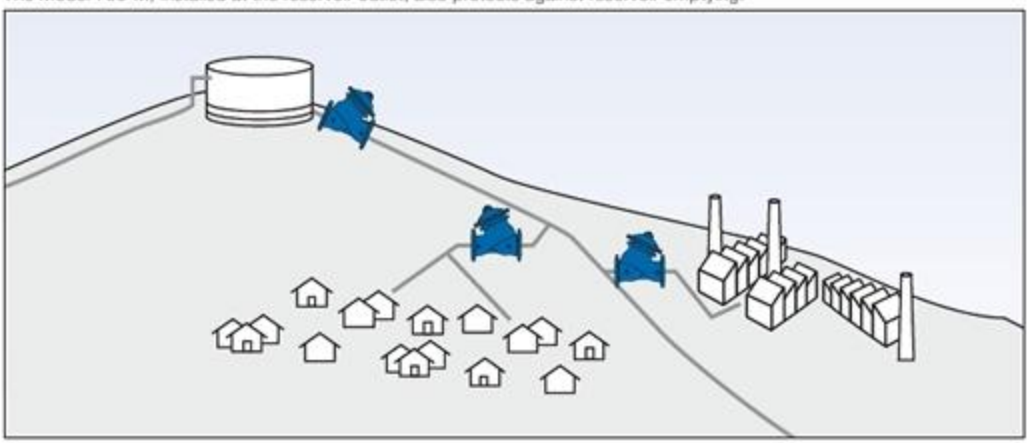
Typical Applications

Burst Control Valves in a Network

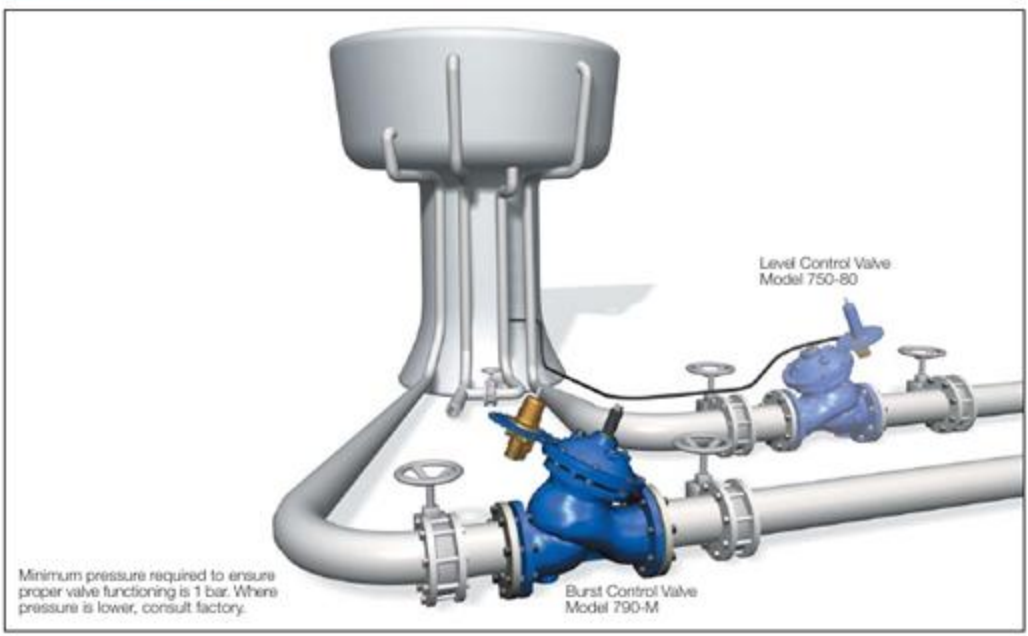
Every water system is vulnerable to bursts, whether due to system problems or external mechanical damage. This illustration shows a reservoir feeding a downhill line with lower elevation consumers.

In case of burst, each Model 790-M protects against flooding lower elevation consumers.

The Model 790-M, installed at the reservoir outlet, also protects against reservoir emptying.



Typical Installation



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	10.5	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
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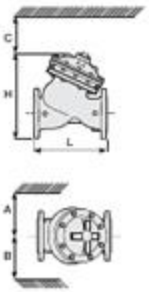
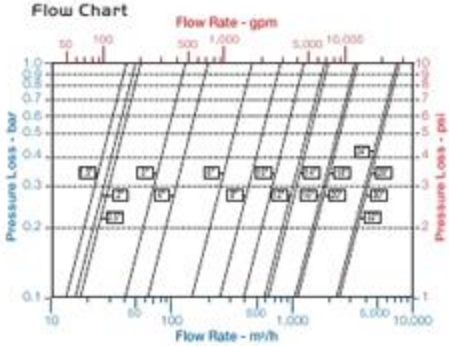
300	12"	545	22	685	27	725	28.5	840	33.1	370	816
350	14"	545	22	685	27	733	28.9	866	34.1	381	840
400	16"	645	26	965	38	990	39.0	1108	43.6	840	1863
450	18"	645	26	965	38	1000	39.4	1127	44.4	945	2083
500	20"	645	26	965	38	1100	43.3	1167	45.9	962	2121

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 disk 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 Nylon fabric-reinforced
Seals: NBR
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
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Pilot Standard Materials:
Body: Brass, Bronze or Stainless Steel
Diaphragm covers: Fusion bonded epoxy coated steel
Elastomers: NBR
Springs: Stainless Steel
Internals: Stainless Steel

Pilot Valve Selection

Valve Size	PN	Pilot Type			
		#83	#3	#83HC	#3HC
1½-14" 40-350 mm	16	■			
	25		■		
16-32" 400-800 mm	16			■	
	25				■

■ Pilots are modified to: differential remote sensing-model "DR".

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"	790	00	Y	C	16	EB	–	CB	M
Waterworks	1½ - 32"	Burst Control								

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

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

Additional Feature

No Additional Feature	00
Closing and Opening Speed Control	03
Check Valve	20
Solenoid Controlled & Check Valve	25
Hydraulic Remote Controlled	50
Solenoid Controlled	55
Electric Override	59

Multiple choices permitted

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 additional electric control feature is selected

Tubing & Fittings

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

Additonal Attributes

Flow Stem	M
Large Control Filter	F
Orifice Assembly	U
Pilot Tube	I
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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Burst Control & Pressure Reducing Valve

Excessive Flow

- "Older" burst susceptible networks
- Vulnerable network infrastructure facilities
- Networks at risk of mechanical damage
- Flow and leakage reduction
- System maintenance savings

The Model 792-U Burst Control & Pressure Reducing Valve is a hydraulically operated, diaphragm actuated control valve with two independent functions. When flow is below setting, it reduces higher upstream pressure to lower pre-set downstream pressure, regardless of varying demand or upstream pressure. Upon sensing flow in excess of setting, it shuts off drip tight and locks (until it is manually reset).

Features and Benefits

- **Line pressure driven** – Independent operation
- **Hydraulic flow sensor (upstream installation)**
  - No moving parts
  - No electronic components
  - No need for flow straighten
- **Sensitive hydraulic pilot** – Tight setting window
- **In line serviceable** – Easy maintenance
- **Double chamber design**
  - Moderated valve reaction
  - Protected diaphragm
- **"Y" or angle, wide body** – Minimized pressure loss
- **Obstacle free, full bore** – Uncompromising reliability
- **Stainless Steel raised seat** – Cavitation damage resistant
- **Semi-straight flow** – Non-turbulent flow
- **V-Port Throttling Plug** – Low flow stability

Major Additional Features

- Solenoid control – **792-55-U**
- Electric override – **792-59-U**
- Downstream over-pressure guard – **792-48-U**
- Electronic multi-level setting, Type 4T – **792-4T-U**

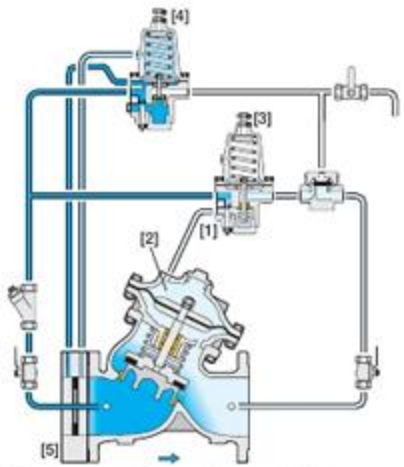
See relevant BERMAD publications.

Operation

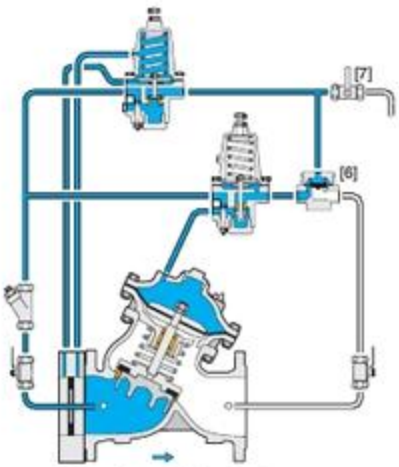
The Model 792-U is a pilot controlled valve equipped with an Orifice assembly, a Hydraulic Relay Valve (HRV) and two adjustable 2-Way pilots.

The needle valve **[1]** continuously allows flow from the valve inlet into the upper control chamber **[2]**. The Pressure Reducing Pilot **[3]** senses downstream pressure. Should this pressure rise above pilot setting, the pilot throttles and causes the pressure in the upper control chamber to accumulate. This causes the main valve to throttle closed decreasing downstream pressure to pilot setting.

The Differential Pressure Sustaining Pilot **[4]** senses the differential pressure across the orifice plate **[5]**. Should this differential pressure rise above pilot setting the pilot opens closing the HRV **[6]**. Thus causing the main valve to begin an irreversible "close & lock" process. Opening and resetting the main valve requires manual intervention by means of the manual reset valve **[7]**.



Valve Reduces Pressure (normal flow)



Valve Closed & Locked

Engineer Specifications

The Burst Control & Pressure Reducing Valve shall reduce higher upstream pressure to lower pre-set downstream pressure. Upon sensing flow in excess of setting, it shall shut off drip tight and lock (until it is manually reset).

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.

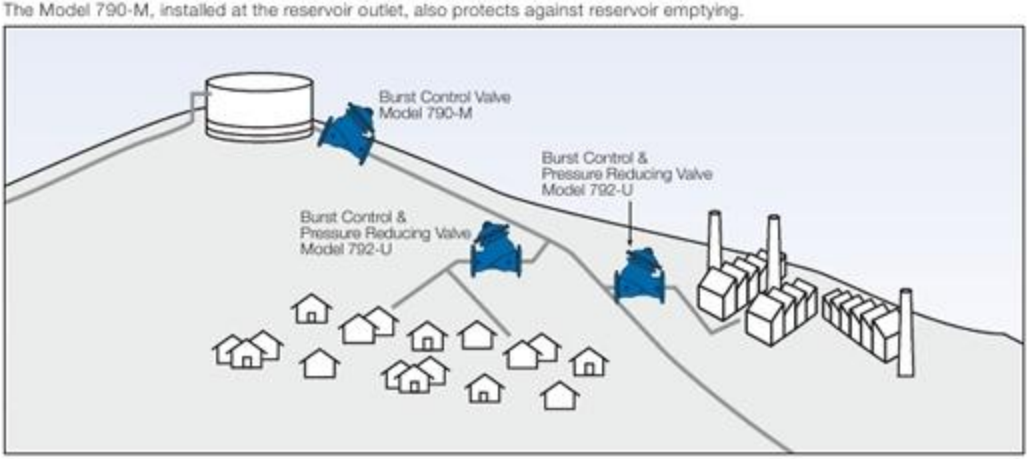
Control System: The control system shall consist of two 2-Way adjustable, direct acting pilots (Pressure Reducing and Differential Pressure Sustaining), an Orific assembly, a Hydraulic Relay Valve, Manual Reset Valve, cock valves, and a filter. All fittings shall be forged brass or stainless steel. The 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 main valve shall be certified as a complete drinking water valve according to NSF, WRAS, and other recognized standards.

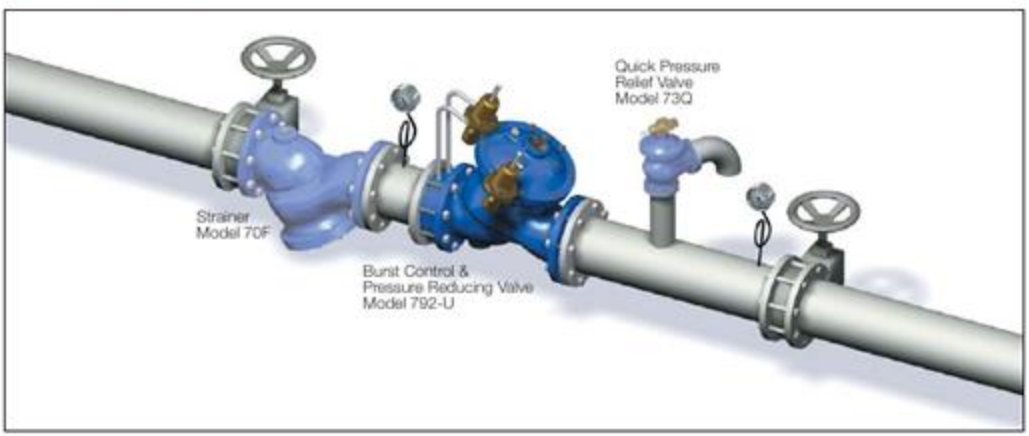
Typical Applications

Burst Control Valves in a Network

Every water system is vulnerable to bursts, whether due to system problems or external mechanical damage. This illustration shows a reservoir feeding a downhill line with lower elevation consumers. Each Model 792-U protects the lower elevation consumers. It reduces their supply pressure and, in case of burst, "closes & locks", preventing flooding.
The Model 790-M, installed at the reservoir outlet, also protects against reservoir emptying.



Typical Installation



BERMAD Waterworks

700 Series

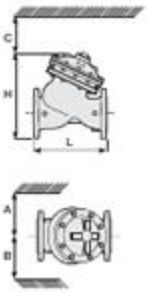
Model 792-U

Technical Data

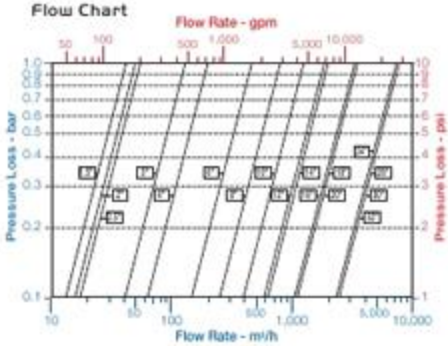
Dimensions and Weights

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 disk 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 Nylon fabric-reinforced
Seals: NBR
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
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Pilot Standard Materials:
Body: Brass, Bronze or Stainless Steel
Diaphragm covers: Fusion bonded epoxy coated steel
Elastomers: NBR
Springs: Stainless Steel
Internals: Stainless Steel

Orifice Assembly Standard Materials:
Body: Fusion bonded epoxy Steel or Stainless Steel
Orifice Plate: Stainless Steel
Sensing Ports: ¼" NPT

▪ Standard (calculated) differential pressure: 0.4 bar (5.5 psi)

Pilot Valve Selection

Valve Size	Burst Control Pilot	Pressure Reducing Pilot		
	#3-DR	#2PB	#2	#2HC
1½-10" DN40-250	▪	▪		
6-14" DN150-350	▪		▪	
16-32" DN400-800	▪			▪

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"	792	00	Y	C	16	EB	–	CB	U

Waterworks | 1½ - 32" | Burst Control & PressureReducing

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	
Epoxy FB Blue	EB
Polyester Green	PG
Polyester Blue	PB
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 additional electric control feature is selected

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

Additonal Attributes	
No Additional Feature	00
Closing and Opening Speed Control	03
Check Valve	20
Solenoid Controlled & Check Valve	25
Hydraulic Remote Controlled	50
Solenoid Controlled	55
Electric Override	59

Multiple choices permitted

Additonal Attributes	
Orifice Assembly	U
Pitot Tube	I
Large Control Filter	F
Electeic 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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High Pressure, Pressure Reducing Valve

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

The Model 820 High Pressure, Pressure Reducing Valve is a hydraulically operated, piston actuated control valve that reduces higher upstream pressure to lower constant downstream pressure regardless of fluctuating demand or varying upstream pressure.

Features and Benefits

- **Robust structure, piston actuated** – High pressure service
- **Line pressure driven** – Independent operation
- **In-line serviceable** – Easy maintenance
- **Double chamber design** – Moderated valve reaction
- **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
- **Stainless Steel raised seat** – Cavitation damage resistant
- **Obstacle free, full bore** – Uncompromising reliability
- **V-Port Throttling Plug** – Low flow stability

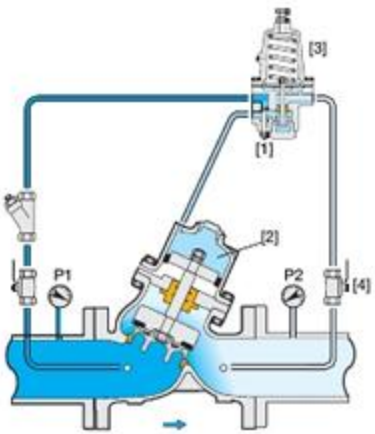
Major Additional Features

- Solenoid control – **820-55**
- Check valve – **820-20**
- Solenoid control & check valve – **820-25**
- Proportional – **820-PP**
- Emergency pressure reducing valve – **820-PP-59**
- Downstream over pressure guard – **820-48**
- Electrically selected multi-level setting – **820-45**
- Electronic multi-level setting, Type 4T – **820-4T**
- Electronic pressure reducing valve – **828-03**

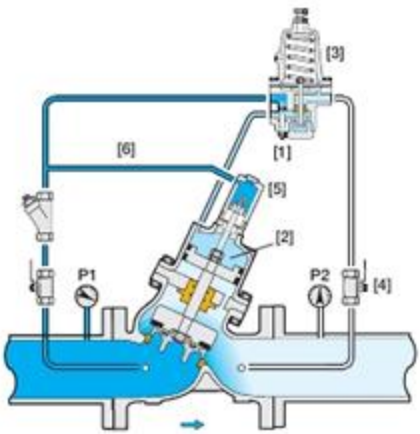
Operation

The Model 820 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 the accumulated pressure, and the main valve modulates open. The needle valve controls the closing speed. The downstream cock valve **[4]** enables manual closing.
Two Models are available, the Standard, Double Chamber 820-PB and the Single Chamber 820-PA*.
The Model 820-PA requires auxiliary closing force. In the size range 6-20"; DN150-500, it is equipped with an auxiliary closing piston **[5]** connected to valves inlet via a control tube **[6]**. In the size range 1¼-4"; DN40-100, an auxiliary closing spring replaces the piston and the tube.

* Apply Model 820-PA when required pressure-reduction ratio (P1/P2) is less than 2.5.



Model 820-PB
Apply when P1/P2>2.5



Model 820-PA
Apply when P1/P2<2.5

Engineer 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, piston 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. 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 a sealed inherent separating partition between the lower surface of the piston and the main valve. 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.

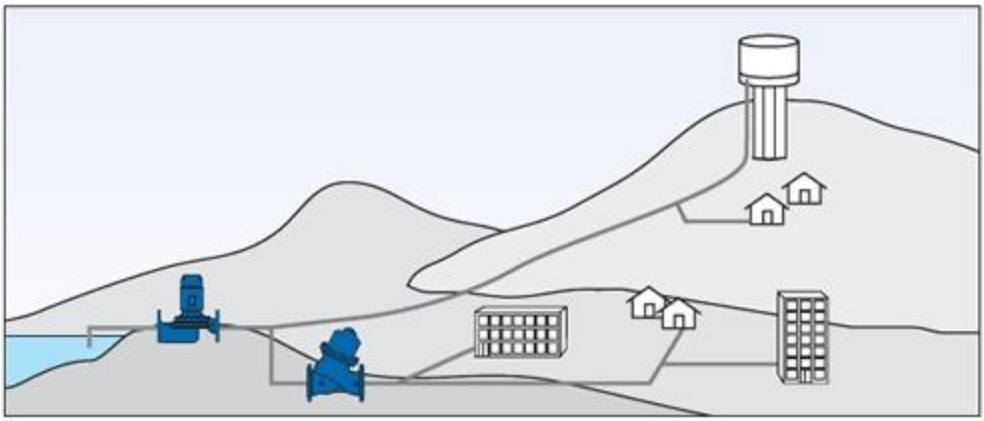
Control System: The control system shall consist of a 2-Way adjustable, direct acting, pressure reducing pilot valve, a needle valve, isolating cock valves, and a filter. All fittings shall be forged brass or stainless steel. The assembled valve shall be hydraulically tested and factory adjusted to customer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

Quality Assurance: The valve manufacturer shall be certified according to the ISO 9001 Quality Assurance Standard.

Typical Applications

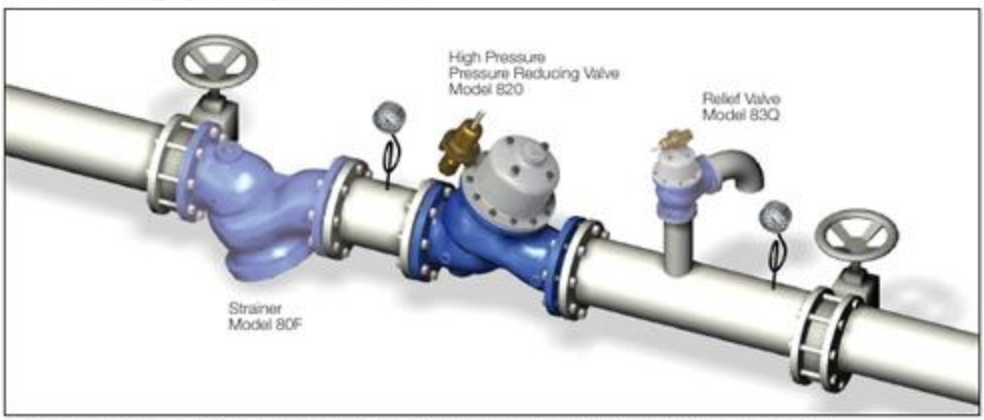
Pressure Reducing System for Municipal Networks

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 820 High Pressure, Pressure Reducing Valve**, BERMAD recommends that the system also include:

- **High Pressure Strainer** Model 80F preventing debris from damaging valve operation
- **High Pressure, Pressure Relief Valve** Model 83Q providing:
  - Protection against momentary pressure peaks
  - Visual indication of need for maintenance

For more information on BERMAD Pressure Reducing Systems, see BERMAD publication 720, Pressure Reducing Valve.

800 Series

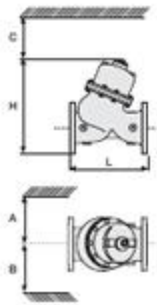
Model 820

Technical Data

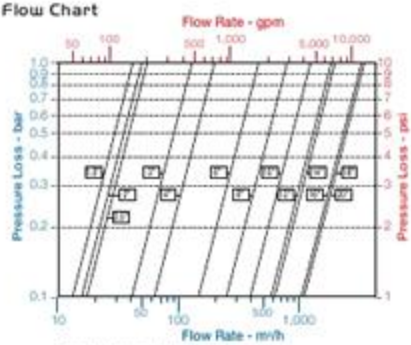
Dimensions and Weights

Size		A, B		C		L		H		Weight	
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	kg	lbs
40	1½"	210	8	180	7	205	8.1	260	10.2	11.8	26
50	2"	210	8	180	7	210	8.3	265	10.4	15	33
65	2½"	210	8	180	7	222	8.7	278	10.9	18.4	40
80	3"	230	9	230	9	264	10.4	332	13.1	32	70
100	4"	255	10	275	11	335	13.2	422	16.6	56	123
150	6"	290	11	385	15	433	17	542	21.3	108	238
200	8"	335	13	460	18	524	20.6	666	26.2	190	418
250	10"	380	15	580	23	637	25.1	783	30.8	307	675
300	12"	405	16	685	27	762	30	961	37.8	505	1111
350	14"	405	16	685	27	767	30.2	996	39.2	549	1208
400	16"	505	20	965	38	1024	40.3	1179	46.4	1076	2354
450	18"	505	20	965	38	1030	40.5	1208	47.6	1095	2409
500	20"	505	20	965	38	1136	44.7	1241	48.9	1129	2484

Data is for Y-pattern, PN25,40/ANSI300,400 valves
Weight is for basic valves
For more dimensions and weights tables, refer to Engineering Section.



Flow Chart



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

Main Valve

Valve Patterns: "Y" (globe) & angle
Size Range: 1"/2–20" (40-500 mm)*
End Connections (Pressure Ratings):
Flanged: ISO PN16, PN25, PN40 (ANSI Class 150, 300, 400)
Others: Available on request
Working Temperature:
Water up to 80°C (180°F)
Standard Materials:
Body: Carbon Steel or Ductile Iron
Cover (piston cylinder):
Bronze or Stainless Steel
Internals:
Stainless Steel & Bronze
Seals: NBR
Coating:
Fusion Bonded Epoxy, RAL 5005 (Blue)
NSF & WRAS approved or Electrostatic Polyester Powder, RAL 6017 (Green)

* 16-20" (400-500mm) valves are rated PN25 (Class 300)

Control System

Standard Materials:
Accessories:
Bronze, Brass, Stainless Steel & NBR
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Pilot Standard Materials:
Body: Brass, Bronze or Stainless Steel
Elastomers: NBR
Springs: Galvanized Steel or Stainless Steel
Internals: Stainless Steel

Additional Head Loss Table

The model 820-PA is equipped with either an auxiliary closing spring (1½-4" / 40-100mm) or an auxiliary closing piston (6-20" / 150-500mm) thus causing an additional head loss of:

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

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"	820	PB	Y	S	40	EB	–	NN	VI
Waterworks	1½ - 20"	Pressure Reducing		Oblique(up to 20°) Y Angle (up to 18°) A		Epoxy FB Blue EB Polyester Green PG Polyester Blue PB Uncoated UC		Copper Tubing & Brass Fittings CB St. St. 316 Tubing & Fittings NN		
			Double chambered PB Single chambered PA No Additional Feature 00 Closing and Opening Speed Control 03 Automatic Regulation Override 09 Check Valve 20 Solenoid Controlled & Check Valve 25 Multi-Setting Levels - Electrically Selected 45 Downstream Over Pressure Guard 48 Hydraulic Control 50 Solenoid Controlled 55 Electric Override 59		Cast Steel S Ductile Iron Standard C St. Steel 316 N Nickel Alumin. Bronze U				Valve Position Indicator I V-Port Throttling Plug V Large Control Filter F Electric Limit Switch S 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		ISO-16 16 ISO-25 25 ISO-40 40 ANSI-150 A5 ANSI-300 A3 ANSI-400 A4 JIS-16 J6 JIS-20 J2 JIS-30 J3		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 additional electric control feature is selected.		Multiple choices permitted	

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High Pressure, Proportional Pressure Reducing Valve

- Long downhill lines
  - Serial pressure reduction
  - Leakage and burst protection
- High differential pressure systems
  - Protection against cavitation damage
  - Throttling noise reduction

The Model 820-PP High Pressure, Proportional Pressure Reducing Valve is a hydraulically operated, piston actuated control valve that reduces higher upstream pressure to lower downstream pressure at a fixed ratio.

Features and Benefits

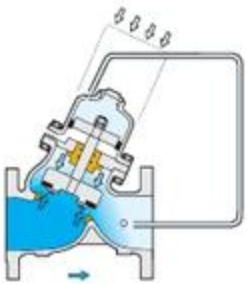
- **Robust structure, piston actuated** – High pressure service
- **Line pressure driven** – Independent operation
- **Elegant simplicity**
  - Most cost effective
  - Simple to maintain
  - Minimal external accessories
- **Built-in check feature** – Replacing line sized check valve
- **In-line serviceable** – Easy maintenance
- **Double chamber** – Moderated valve reaction
- **Flexible design** – Easy addition of features
- **Semi-straight flow** – Non-turbulent flow
- **Stainless Steel raised seat** – Cavitation damage resistant
- **Obstacle free, full bore** – Uncompromising reliability
- **V-Port Throttling Plug** – Low flow stability

Major Additional Features

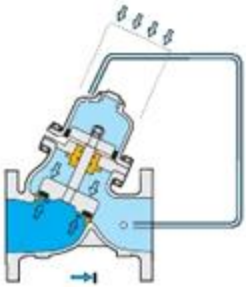
- Solenoid control – **820-PP-55**
- Closing & opening speed control – **820-PP-03**
- Emergency pressure reducing valve – **820-PP-59**
- Pressure sustaining – **823-PB**

Operation

The Model 820-PP is a pilotless, double chambered control valve. The downstream pressure is applied as the closing force on the top side of both the piston and the seal disk areas. The upstream pressure is applied as the opening force on the bottom side of the seal disk area.
The net force, resulting from the two opposing dynamic forces acting on the actuator's piston and seal, determines the degree to which the valve is open. The valve seeks the point where these forces are equal. As the ratio of the areas of the seal disk and the piston is constant, the ratio of the upstream and downstream pressures is constant as well.
A rise in downstream pressure causes a momentary increase of the closing force. As a result, the valve throttles closed reducing downstream pressure according to the constant ratio.
When demand is zero, downstream pressure rises in proportion to the ratio, causing the valve to shut off.



Valve Regulates



Valve Closed (no system demand)

Engineer Specifications

The Proportional Pressure Reducing Valve shall reduce higher upstream pressure to lower downstream pressure at a fixed ratio. The valves control loop shall not consist of any pilot. The reduction ratio shall not vary according to the flow.

Main Valve: The main valve shall be a center guided, piston 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. 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 a sealed inherent separating partition between the lower surface of the piston and the main valve. 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.

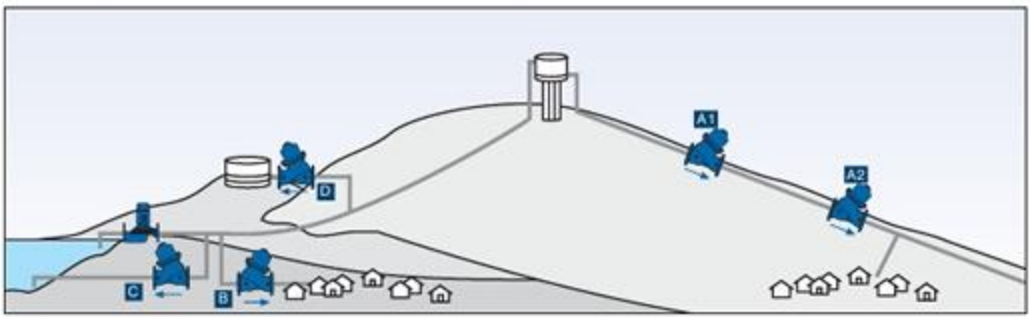
Control System: The control system shall consist of a control tube connecting the upper control chamber to the valve outlet. All fittings shall be forged brass or stainless steel. The assembled valve shall be hydraulically tested to customer requirements.

Quality Assurance: The valve manufacturer shall be certified according to the ISO 9001 Quality Assurance Standard.

Typical Applications

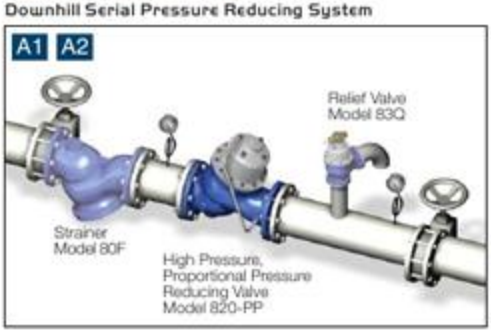
There are two major applications for the Model 820-PP High Pressure, Proportional Pressure Reducing Valve:

- Long downhill lines:
  - Systems A1 and A2 prevent the downhill line from exceeding its pressure rating.
- High differential pressure systems:
  - System B reduces cavitation damage and noise level by distributing the load of the high differential pressure.
  - System C illustrates protection of a circulation valve from high differential pressure and resultant severe cavitation.
  - System D shows protection of a level control valve from high differential pressure.

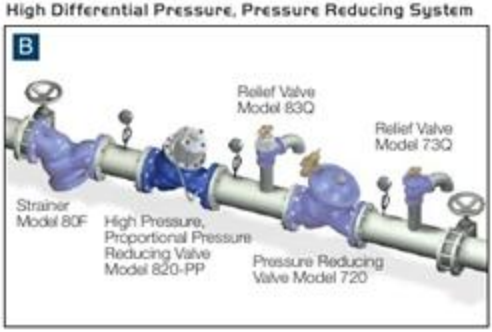


Typical Installations

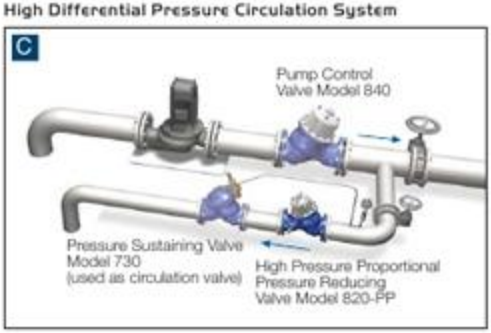
Downhill Serial Pressure Reducing System



High Differential Pressure, Pressure Reducing System



High Differential Pressure Circulation System



High Differential Pressure Level Control System

BERMAD Waterworks

800 Series

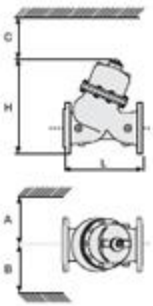
Model 820-PP

Technical Data

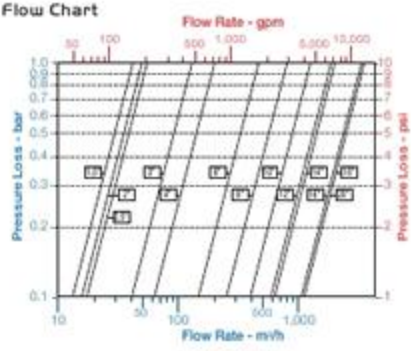
Dimensions and Weights

Size		A, B		C		L		H		Weight	
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	kg	lbs
40	1½"	210	8	180	7	205	8.1	260	10.2	11.8	26
50	2"	210	8	180	7	210	8.3	265	10.4	15	33
65	2½"	210	8	180	7	222	8.7	278	10.9	18.4	40
80	3"	230	9	230	9	264	10.4	332	13.1	32	70
100	4"	255	10	275	11	335	13.2	422	16.6	56	123
150	6"	290	11	385	15	433	17	542	21.3	108	233
200	8"	335	13	460	18	524	20.6	666	26.2	190	418
250	10"	380	15	580	23	637	25.1	783	30.8	307	675
300	12"	405	16	685	27	762	30	961	37.8	505	1111
350	14"	405	16	685	27	767	30.2	996	39.2	549	1208
400	16"	505	20	965	38	1024	40.3	1179	46.4	1078	2354
450	18"	505	20	965	38	1030	40.5	1208	47.6	1095	2409
500	20"	505	20	965	38	1136	44.7	1241	48.9	1129	2484

Data is for Y-pattern, PN25,40/ANS0300,400 valves
Weight is for basic valves
For more dimensions and weights tables, refer to Engineering Section.



Flow Chart



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

Main Valve

Valve Patterns: "Y" (globe) & angle
Size Range: 1½–20" (40-500 mm)*
End Connections (Pressure Ratings):
Flanged: ISO PN16, PN25, PN40 (ANSI Class 150, 300, 400)
Others: Available on request
Working Temperature:
Water up to 80°C (180°F)
Standard Materials:
Body: Carbon Steel or Ductile Iron
Cover (piston cylinder):
Bronze or Stainless Steel
Internals:
Stainless Steel & Bronze
Seals: NBR
Coating:
Fusion Bonded Epoxy, RAL 5005 (Blue)
NSF & WRAS approved or Electrostatic Polyester Powder, RAL 6017 (Green)

* 16-20" (400-500mm) valves are rated PN25 (Class 300)

Reduction Ratios Table

Valve Size	Reduction Ratio
1½–2½" 40- 65 mm	2.3
3" 80 mm	2.3
4" 100 mm	2.5
6" 150 mm	2.2
8" 200 mm	2.3
10" 250 mm	2.3
12-14" 300-350 mm	2.1
16-20"* 400-500 mm*	2.2

Control System

Standard Materials:
Accessories: Bronze, Brass, Stainless Steel & NBR
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel

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"	820	PP	Y	S	40	EB	–	NN	VI

Sector: WW – Waterworks

Size: 1½ - 20"

Primary Feature: 820 – Proportional Pressure Reducing

Additional Feature:

Automatic Regulation Override	09
Solenoid Controlled	55
Electric Override	59
Proportional Standard Ratio	PP

Multiple choices permitted

Pattern:

Oblique (up to 20")	Y
Angle (up to 18")	A

Body Material:

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

End Connections:

ISO-16	16
ISO-25	25
ISO-40	40
ANSI-150	A5
ANSI-300	A3
ANSI-400	A4
JIS-16	J6
JIS-20	J2
JIS-30	J3

Coating:

Epoxy FB Blue	EB
Polyester Green	PG
Polyester Blue	PB
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 additonal electric control feature is selected.

Tubing & Fittings:

Copper Tubing & Brass Fittings	CB
St. St. 316 Tubing & Fittings	NN

Additonal Attributes:

Valve Position Indicator	I
V-Port Throttling Plug	V
Electric Limit Switch	S
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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High Pressure, Surge Anticipating Control Valve

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

The Model 835-M High Pressure, Surge Anticipating Valve is an off-line, hydraulically operated, piston 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 835-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

- **Robust structure, piston actuated** – High pressure service
- **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)
- **In-line serviceable** – Easy maintenance
- **Obstacle free, full bore** – Uncompromising reliability
- **Balanced seal disk** – High flow capacity

Major Additional Features

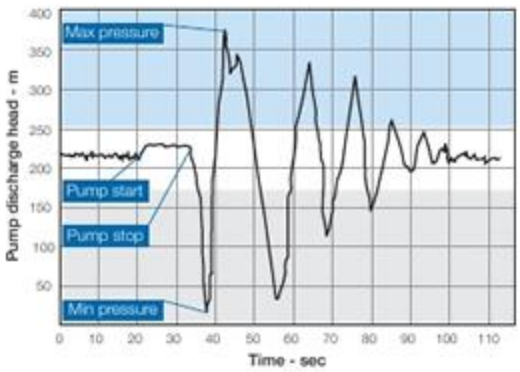
- Solenoid control – **835-55-M**
- Sensing diaphragm (for sewage) – **835-Md**
- Quick pressure relief valve – **83Q**

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 835-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.

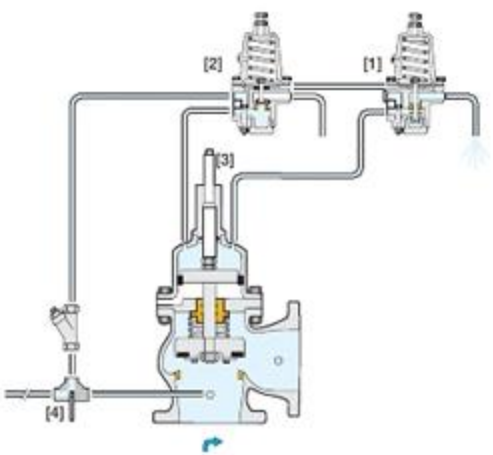
The already opened Model 835-M releases the returning column of water, minimizing the line pressure rise. Should the relief rate be insufficient, and the pressure exceeds the High Pressure (HP) pilot **[2]** setting, the pilot immediately opens, further opening the main valve.

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.

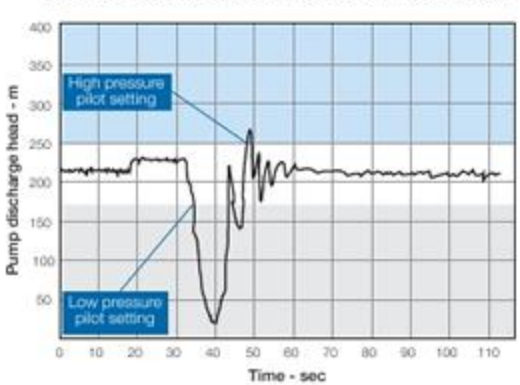
The flow stem **[3]** limits the relief flow to prevent column separation and preserve closing pressure.

Cock valve **[4]** serves for selecting operating and sensing source:

- Directly from main discharge line - Recommended (see "Typical Application")
- From Model 835-M inlet



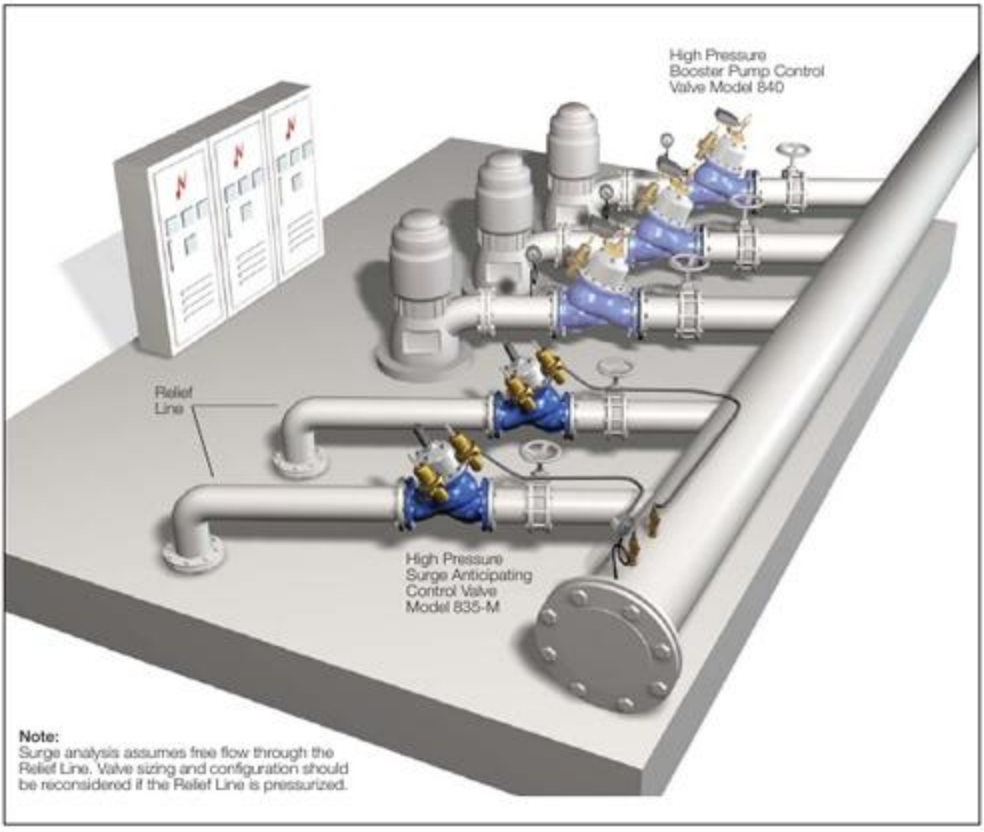
Pressure at Pump Station Protected by Model 835-M



Typical Applications

In this system, a pump battery supplies the main line through a manifold. The Model 835-M:

- Eliminates surge on power failure
- Provides surge free switching between "on-duty" pumps
- Closes smoothly according to pilot setting



Note:
Surge analysis assumes free flow through the Relief Line. Valve sizing and configuration should be reconsidered if the Relief Line is pressurized.

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 and computer software, BERMAD's experienced engineers can perform the desired analysis.
For best analysis, all of the 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:

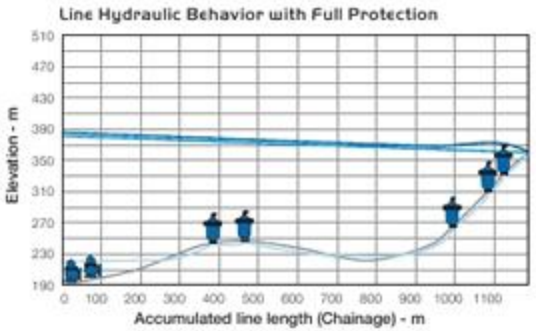
- System layout including pumping station, and consumer locations and characteristics
- Head Gradient Line (HGL) for each and every node based on "Network-Solver" analysis

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

- Pressure of ~32 bar
  (see max. pressure envelope line)
- Vacuum conditions
  (see min. pressure envelope line)

Simulated surge protection recommends:

- Two Model 835-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 ~19 bar
  (see max. pressure envelope line)
- No appreciable vacuum
  (see min. pressure envelope line)



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

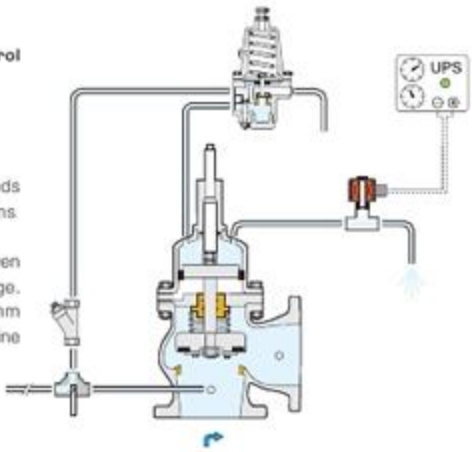
Additional Application

High Pressure, Surge Anticipating Valve with Solenoid Control
Model 835-55-M

This model 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 immediately energizes the Model 835-55-M, normaly closed DC solenoid, even prior to the pressure drop associated with abrupt pump stoppage. The already opened Model 835-55-M releases the returning columm of water eliminating the surge. The Model 835-55-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

The Model 835-55-M Surge Anticipating Valve with Solenoid Control should remain closed except in the event of power failure. This 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 **U**n-Interruptible **P**ower **S**ource **(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 valve to start closing

Engineer 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, piston 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. 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 a sealed inherent separating partition between the lower surface of the piston and the main valve. 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 control tube connecting the upper control chamber to the valve outlet. All fittings shall be forged brass or stainless steel. The assembled valve shall be hydraulically tested to customer requirements.

Quality Assurance: The valve manufacturer shall be certified according to the ISO 9001 Quality Assurance Standard.

BERMAD Waterworks

800 Series

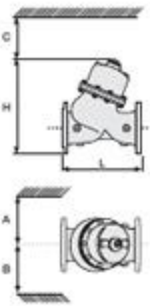
Model 835-M

Technical Data

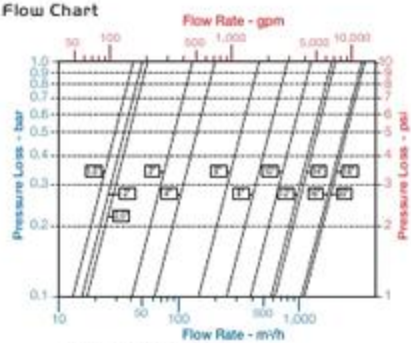
Dimensions and Weights

Size		A, B		C		L		H		Weight	
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	kg	lbs
40	1½"	210	8	180	7	205	8.1	260	10.2	11.8	26
50	2"	210	8	180	7	210	8.3	265	10.4	15	33
65	2½"	210	8	180	7	222	8.7	278	10.9	18.4	40
80	3"	230	9	230	9	264	10.4	332	13.1	32	70
100	4"	255	10	275	11	335	13.2	422	16.6	56	123
150	6"	290	11	385	15	433	17	542	21.3	106	233
200	8"	335	13	460	18	524	20.6	666	26.2	190	418
250	10"	380	15	580	23	637	25.1	793	30.8	307	675
300	12"	405	16	685	27	762	30	961	37.8	505	1111
350	14"	405	16	685	27	787	30.2	996	39.2	549	1208
400	16"	505	20	965	38	1024	40.3	1179	46.4	1070	2354
450	18"	505	20	965	38	1030	40.5	1208	47.6	1095	2409
500	20"	505	20	965	38	1136	44.7	1241	48.9	1129	2484

Data is for Y-pattern, PN25,40/ANSI300,400 valves
Weight is for basic valves
For more dimensions and weights tables, refer to Engineering Section.



Flow Chart



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

Main Valve

Valve Patterns: "Y" (globe) & angle
Size Range: 1"/₄–20" (40-500 mm)*
End Connections (Pressure Ratings):
Flanged: ISO PN16, PN25, PN40 (ANSI Class 150, 300, 400)
Others: Available on request
Working Temperature:
Water up to 80°C (180°F)
Standard Materials:
Body: Carbon Steel or Ductile Iron
Cover (piston cylinder):
Bronze or Stainless Steel
Internals:
Stainless Steel & Bronze
Seals: NBR
Coating:
Fusion Bonded Epoxy, RAL 5005 (Blue)
NSF & WRAS approved or Electrostatic Polyester Powder, RAL 6017 (Green)

* 16-20" (400-500mm) valves are rated PN25 (Class 300)

Control System

Standard Materials:
Accessories:
Bronze, Brass, Stainless Steel & NBR
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Pilot Standard Materials:
Body: Brass, Bronze or Stainless Steel
Elastomers: NBR
Springs: Galvanized Steel or Stainless Steel
Internals: Stainless Steel

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"	835	PB	Y	S	40	EB	–	NN	M

Sector
- Waterworks: WW

Size
- 1"/₄ - 20": 6"

Primary Feature
- Surge Anticipating Control Valve: 835

Additional Feature
- Double Chambered: PB
- No Additional Feature: 00
- Solenoid Controlled: 55

Multiple choices permitted

Pattern
- Oblique(up to 20°): Y
- Angle (up to 18°): A

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
- ISO-40: 40
- ANSI-150: A5
- ANSI-300: A3
- ANSI-400: A4
- JIS-16: J6
- JIS-20: J2
- JIS-30: J3

Coating
- Epoxy FB Blue: EB
- Polyester Green: PG
- Polyester Blue: PB
- 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 additional electric control feature is selected

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

Additonal Attributes
- 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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High Pressure, Booster Pump Control Valve

Active Check Valve

- 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

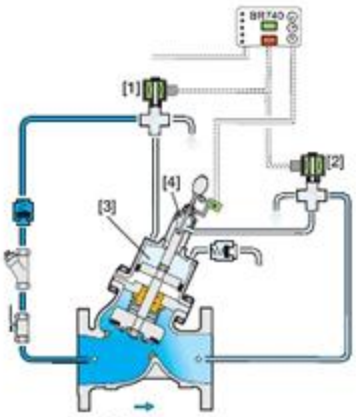
- Pressure sustaining – **843**
- Pressure reducing – **842**
- Flow control – **847-U**
- Pump circulation control – **848**
- Deep well pump electric control – **845**
- Full powered opening & closing – **840-B**
- Electronic control – **840-18**
- Pressure sustaining & Pressure reducing – **843-2Q**

Sequence of Operation (Normally-Open Type)

The Model 840 is a solenoid controlled valve equipped with a limit switch, two 3-Way solenoid pilots and check valves.
Normally Closed type is also available.
For large valves, an accelerator quickens valve response.

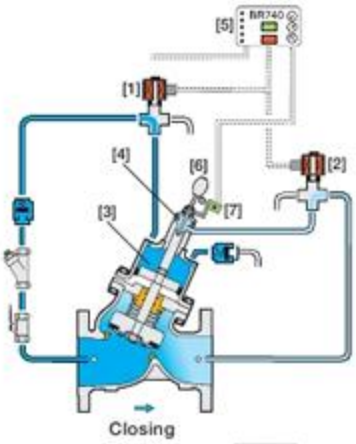
Pump Starting Procedure

Prior to pump start, the valve is hydraulically closed although electrically open. Even though the de-energized solenoids **[1]** & **[2]** vent the upper control chamber **[3]** & the auxiliary closing piston **[4]** they remain full as no hydraulic forces are applied. As pump starts, valve upstream pressure builds and rises above the system static pressure, causing opening hydraulic forces to rise. Pressure from the upper control chamber and the auxiliary closing piston is then released through the solenoids, allowing the valve to open gradually.



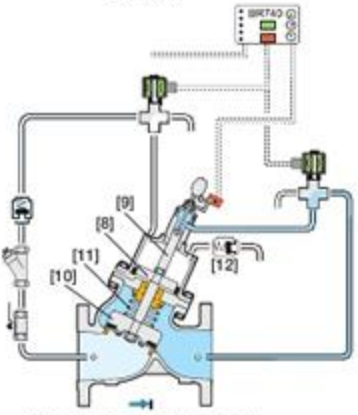
Pump Stopping Procedure

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 BR740-E electronic controller **[5]**, which energizes the solenoids. Solenoid **[1]** applies pumped pressure to the upper control chamber **[3]** while solenoid **[2]** applies system pressure to the auxiliary closing piston **[4]**, 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. After a preset time delay, the controller de-energizes the solenoids 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 piston assemblies **[8]** & **[9]** and on the closure **[10]**, to balance. The spring **[11]** then breaks this balance, closing the valve before the flow can change direction. Check valve **[12]** allows airflow into the upper control chamber to break possible vacuum and quicken the closing speed.

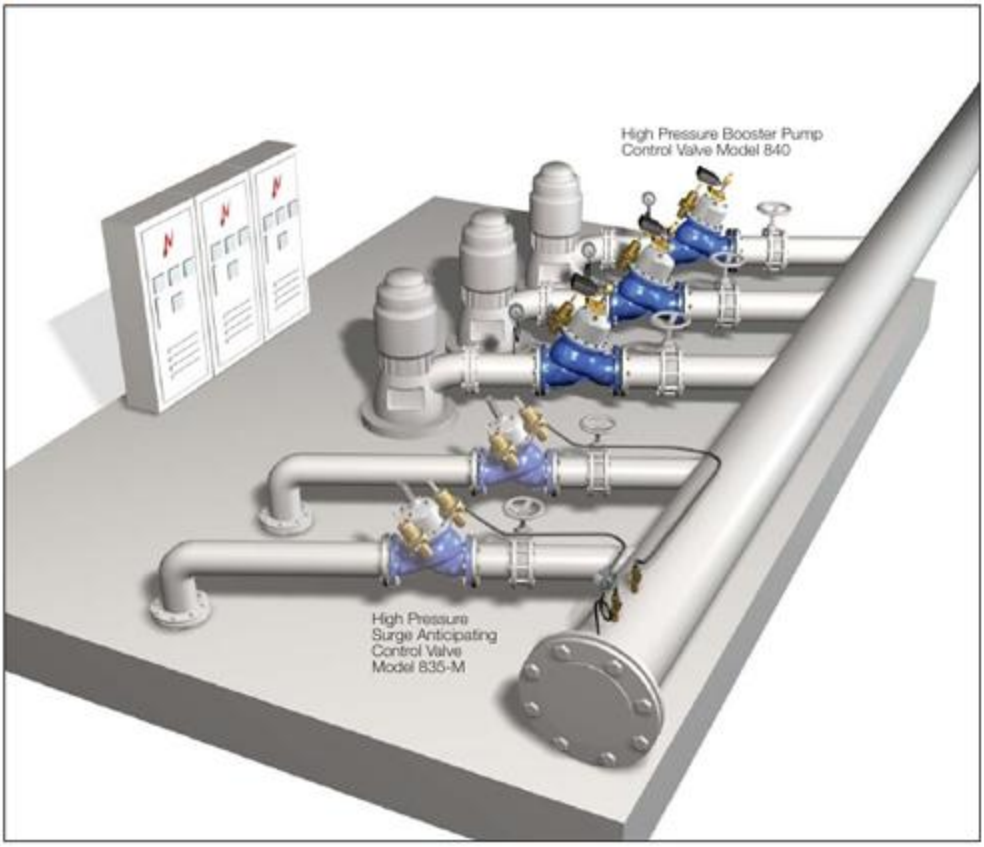


Notes:
(1) Consider installing a Flow or Pressure Switch as indication of pumping during low demand.
(2) Valve configuration and control circuit might vary for PN25, PN40 and/or large diameter valves.

Typical Installation

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.

Additional Applications

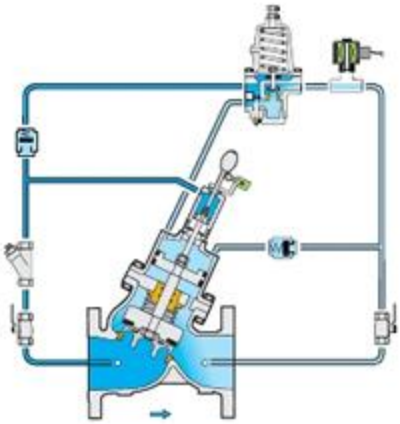
High Pressure, Booster Pump Control & Pressure Sustaining Valve Model 843

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.

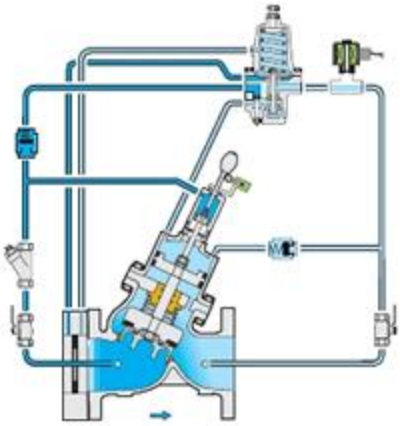


High Pressure, Booster Pump Control & Flow Control Valve Model 847-U

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.



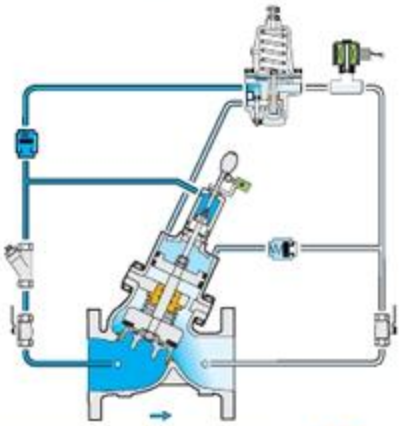
High Pressure Booster Pump Control & Pressure Reducing Valve Model 842

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.



Engineer Specifications

The High Pressure, Pump Control Valve shall open fully or shut off in response to electric signals. It shall isolate the pump from the system during pump starting and stopping to prevent pipeline surges.

Main Valve: The main valve shall be a center guided, piston 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. 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 a sealed inherent separating partition between the lower surface of the piston and the main valve. 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 3-Way solenoid pilots (for 10" and larger valves , an accelerator shall be added), two check valves (for 12" and larger valves, additional check valves), a limit switch, 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.

BERMAD Waterworks

800 Series

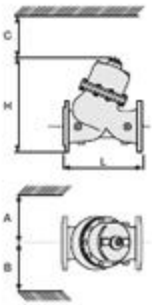
Model 840

Technical Data

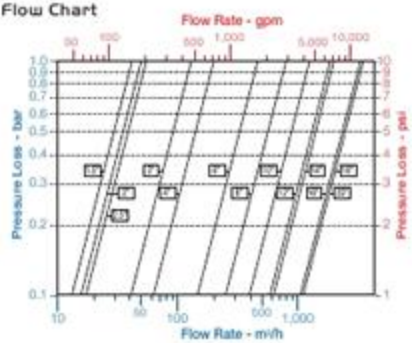
Dimensions and Weights

Size		A, B		C		L		H		Weight	
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	kg	lbs
40	1½"	210	8	180	7	205	8.1	260	10.2	11.8	26
50	2	210	8	180	7	210	8.3	265	10.4	15	33
65	2½"	210	8	180	7	222	8.7	278	10.9	18.4	40
80	3"	230	9	230	9	264	10.4	332	13.1	32	70
100	4"	255	10	275	11	335	13.2	422	16.6	56	123
150	6"	290	11	385	15	433	17	542	21.3	106	233
200	8"	335	13	460	18	524	20.6	666	26.2	190	418
250	10"	380	15	580	23	637	25.1	783	30.8	307	675
300	12"	405	16	685	27	762	30	961	37.8	505	1111
350	14"	405	16	685	27	767	30.2	906	39.2	549	1208
400	16"	505	20	965	38	1024	40.3	1179	46.4	1070	2354
450	18"	505	20	965	38	1030	40.5	1208	47.6	1095	2409
500	20"	505	20	965	38	1136	44.7	1241	48.9	1129	2484

Data is for Y-pattern, PN25,/43/ANSI300,400 valves
Weight is for basic valves
For more dimensions and weights tables, refer to Engineering Section.



Flow Chart



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

Main Valve

Valve Patterns: "Y" (globe) & angle
Size Range: 1½–20" (40-500 mm)*
End Connections (Pressure Ratings):
Flanged: ISO PN16, PN25, PN40 (ANSI Class 150, 300, 400)
Others: Available on request
Working Temperature:
Water up to 80°C (180°F)
Standard Materials:
Body: Carbon Steel or Ductile Iron
Cover (piston cylinder):
Bronze or Stainless Steel
Internals:
Stainless Steel & Bronze
Seals: NBR
Coating:
Fusion Bonded Epoxy, RAL 5005 (Blue)
NSF & WRAS approved or Electrostatic Polyester Powder, RAL 6017 (Green)

* 16-20" (400-500mm) valves are rated PN25 (Class 300)

Control System

Standard Materials:
Accessories:
Bronze, Brass, Stainless Steel & NBR
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Solenoid Standard Materials:
Body: Brass or Stainless Steel
Elastomers: NBR or FPM
Enclosure: Molded epoxy
Solenoid Electrical Data:
Voltages:
(ac): 24, 110-120, 220-240, (50-60 Hz)
(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

Accelerator Standard Materials:
Body: Brass or Stainless Steel
Internals: Stainless Steel & Brass
Elastomers: NBR or FPM

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

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"	840	PB	Y	S	40	EB	4AO	NN	S

Sector
- Waterworks: WW

Size
- 1½ - 20": 6"

Primary Feature
- Booster Pump Control: 840

Additional Feature
- Double chambered: PB
- No Additional Feature: 00
- Closing and Opening Speed Control: 03
- Electronic Control: 18

Multiple choices permitted

Pattern
- Oblique (up to 20°): Y
- Angle (up to 18°): A

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
- ISO-40: 40
- ANSI-150: A5
- ANSI-300: A3
- ANSI-400: A4
- JIS-16: J6
- JIS-20: J2
- JIS-30: J3

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

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

Additonal Attributes
- Double Chamber: B
- Large Control Filter: F
- Electric Limit Switch: S
- Valve Position Transmitter: Q
- Flow Over the Seat: O
- 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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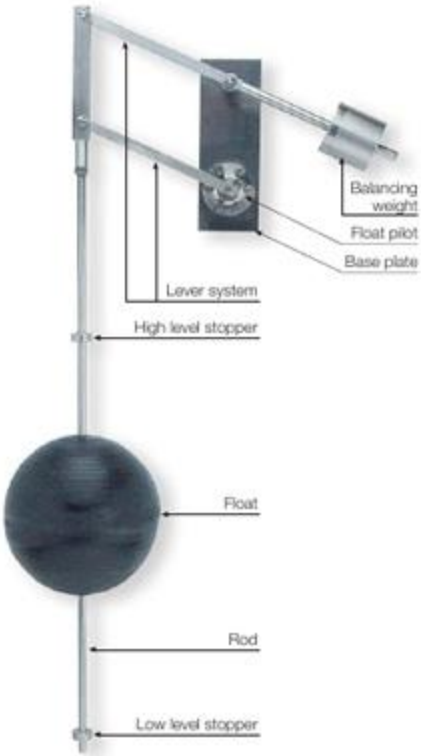
4-Way Bi-Level Vertical Float

This 4-Way, adjustable, last position bi-level vertical float, is actuated by the float sliding along the rod assembly to either pull it down or float it up, switching the float pilot position. When the float is between the adjustable high and low level stoppers, the main valve remains in its last position.

The float pilot directs flow and pressure between its ports:
- When the float pushes the upper stopper up, it connects port "P" to "C1" and port "C2" to "V".
- When the float pulls the lower stopper down, it connects port "P" to "C2" and port "C1" to "V".

The extendable rod is to be balanced by counterweights installed on the lever system according to rod length and system pressure.

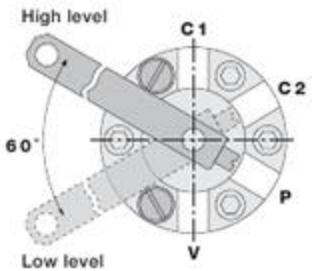


Technical data

Pressure rating: 25 bar (350 psi)
Working temperature: Water up to 80°C (180°F)
Flow factor: Kv 0.17 (Cv 0.2)
Ports: ⅛" NPT
Standard materials:
4-Way pilot body: Brass
Elastomers: NBR
Internals: Stainless Steel & Brass
Lever system: Brass
Float: Plastic
Float rod: Stainless Steel
Base plate: Fusion bonded epoxy coated Steel
Optional materials:
Metal parts: Stainless Steel, Nickel Aluminum Bronze, Hastalloy
Elastomers: FPM (Viton®)

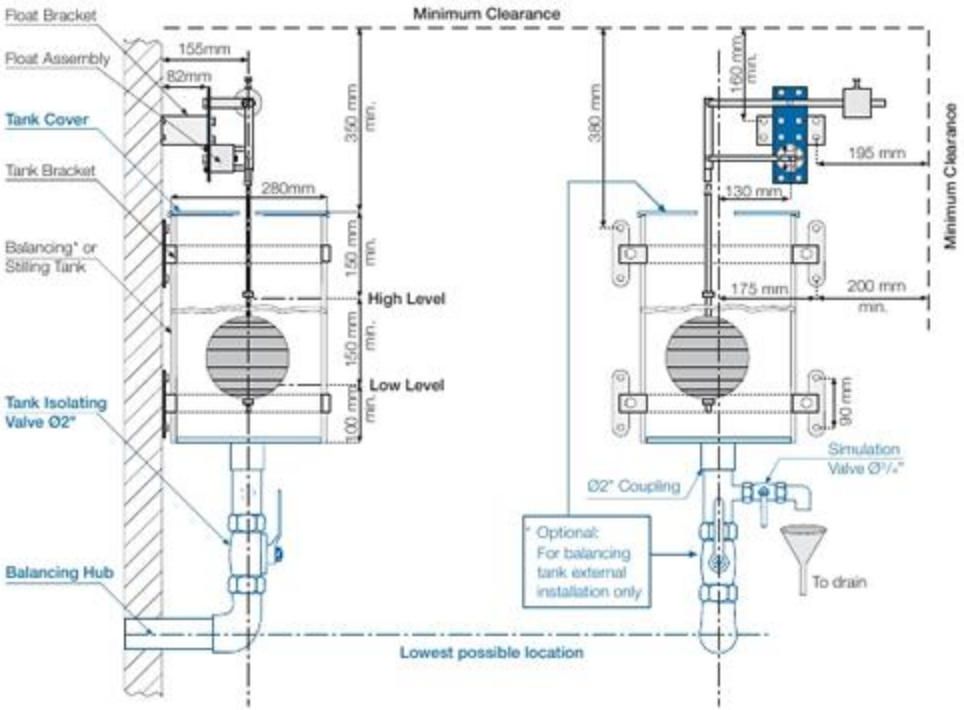
Connections:

Port	Reservoir inlet	Reservoir outlet
C1	Upper control chamber	Lower control chamber
C2	Lower control chamber (or plugged)	Upper control chamber
P	Upstream pressure	Upstream pressure
V	Vent	Vent

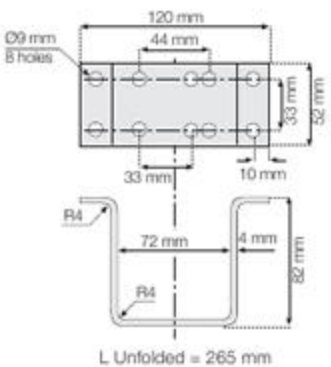


Notes:
- Minimum level differential: 15 cm (6")
- Maximum level differential: 54 cm (21")
- Each extension rod adds 56 cm (22"), one extension rod supplied
- Extra counterweight required if second extension rod used
- Float hydraulic connections: 3 tubes size ¾"

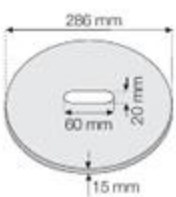
Typical Installation



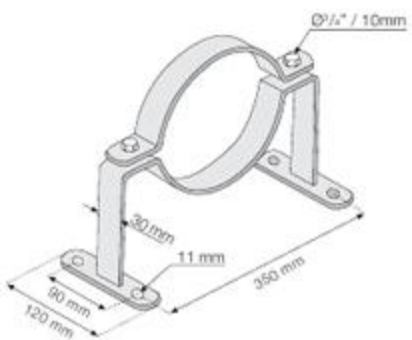
Float 66 Bracket



Tank Cover



Tank Bracket



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2-Way Modulating Vertical Float

This adjustable 2-Way Modulating Vertical Float is actuated by the "locked in place" float either pulling the float assembly rod down or floating it up.

This float can be used to control reservoir filling or emptying:

- When used as a filling level control pilot, it throttles closed as level rises towards set point.
- When used as an emptying level control pilot, it modulates open as level rises towards set point.

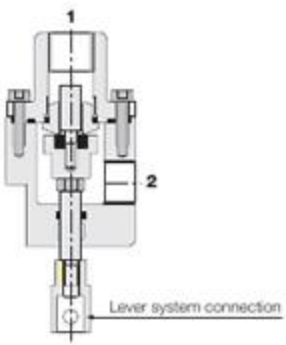
The extendable rod is to be balanced by counterweights installed on the lever system according to rod length and system pressure.

Technical data

Pressure rating: 25 bar (350 psi)
Working temperature: Water up to 80°C (180°F)
Flow factor: Kv 1.3 (Cv 1.5)
Ports: ⅜" NPT
Standard materials:
2-Way pilot body: Brass
Elastomers: NBR
Internals: Stainless Steel & brass
Lever system: Brass
Float: Plastic
Float rod: Stainless Steel
Base plate: Fusion bonded epoxy coated Steel
Optional materials:
Metal parts: Stainless Steel, Nickel Aluminum Bronze, Hastalloy
Elastomers: FPM (Viton®)

Connections:

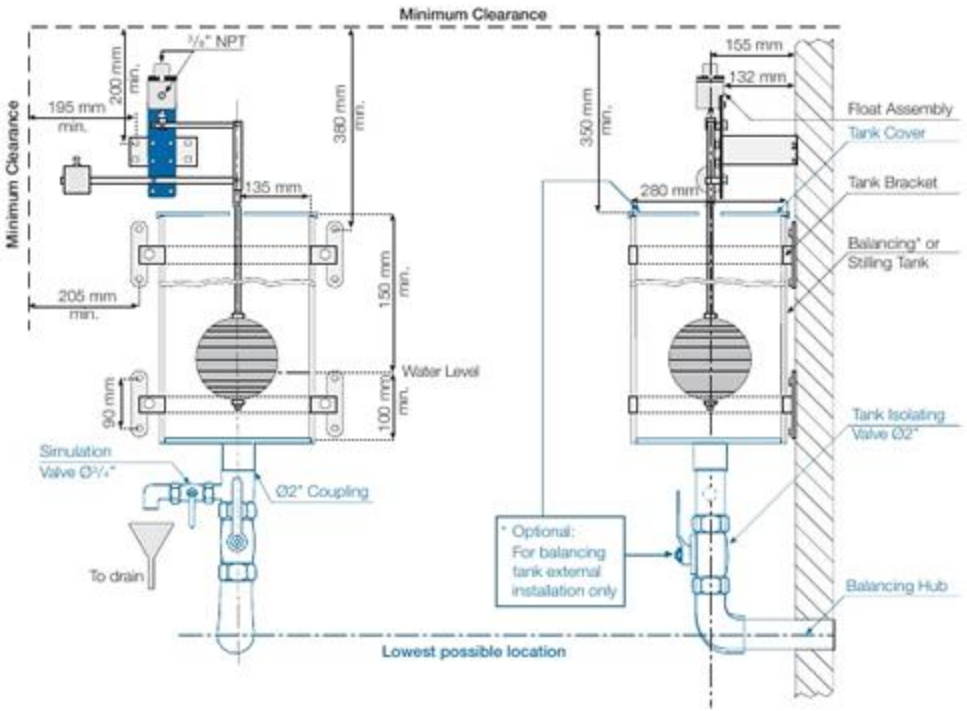
Port	Reservoir inlet (Model: 67)	Reservoir outlet (Model: 67A)
1	Control chamber	Vent
2	Vent	Control chamber



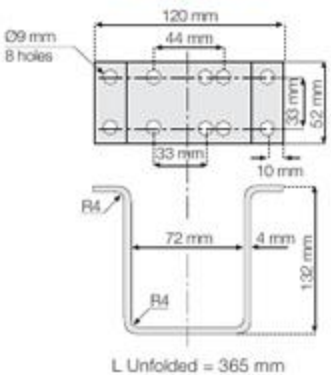
Notes:

- Rod length: 54 cm (21")
- Each extension rod adds 56 cm (22"), one extension rod supplied
- Extra counterweight might be required according to rod length and high operating pressure
- Float hydraulic connections: ½"or larger tube
- For 16-32" (400-800 mm) valves use the high capacity float pilot Model #67HC

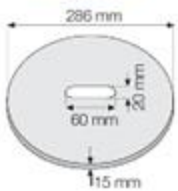
Typical Installation



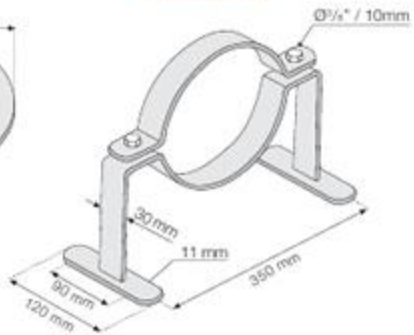
Float 67 Bracket



Tank Cover



Tank Bracket



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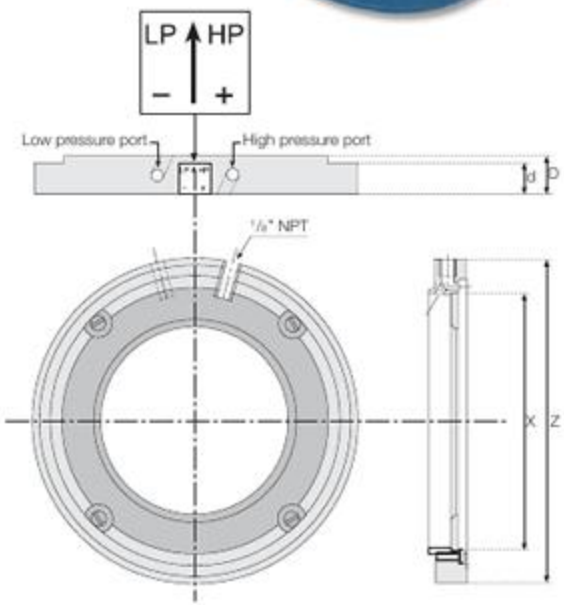
Orifice Plate Assembly

When an orifice plate assembly is used as an integral part of a flow control valve control circuit, it provides the differential pressure (ΔP) to power the flow control pilot. The opening and closing of the pilot causes the flow control valve to throttle accordingly.
Total head loss across the valve is reduced by locating sensing ports close to the orifice plate, to sense downstream pressure before it recovers.
The orifice plate internal diameter is calculated and machined according to valve size and required flow limitation.

Technical Data

Body material:
Fusion bonded epoxy Steel or Stainless Steel
Orifice plate: Stainless Steel
Sensing ports: 1/8" NPT
Standard calculated differential pressure:
0.4 bar (5.5 psi)



Dimensions

Size		Z		X		D		d	
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
50	2	94	3 7/16	53	2 1/16	20	3/4	25	1
65	2 1/2	106	4 3/16	61	2 3/8	20	3/4	25	1
80	3	128	4 15/16	73	2 7/8	20	3/4	25	1
100	4	155	6 1/8	96	3 7/16	20	3/4	25	1
150	6	210	8 1/4	150	5 15/16	20	3/4	25	1
200	8	265	10 7/16	195	7 11/16	20	3/4	25	1
250	10	320	12 5/8	245	9 5/8	20	3/4	25	1
300	12	372	14 5/8	295	11 5/8	20	3/4	25	1
350	14	418	16 7/16	345	13 9/16	24	15/16	30	1 3/16
400	16	482	19	395	15 9/16	20	3/4	25	1
450	18	535	21 1/16	443	17 7/16	20	3/4	28	1 1/8
500	20	590	23 1/4	501	19 3/4	22	7/8	31	1 1/4

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Quick Pressure Relief Pilot Valve

This pilot integrates all principal functions of a 2-Way control circuit in a single assembly.
It is a direct acting valve, actuated by a pressure responsive diaphragm, which tends to reach equilibrium with the set spring force.
The pilot opens at upstream pressure rise above set point.
An integral restriction acts as an upstream flow restrictor smoothing valve closing and simplifying the control circuit.

Features

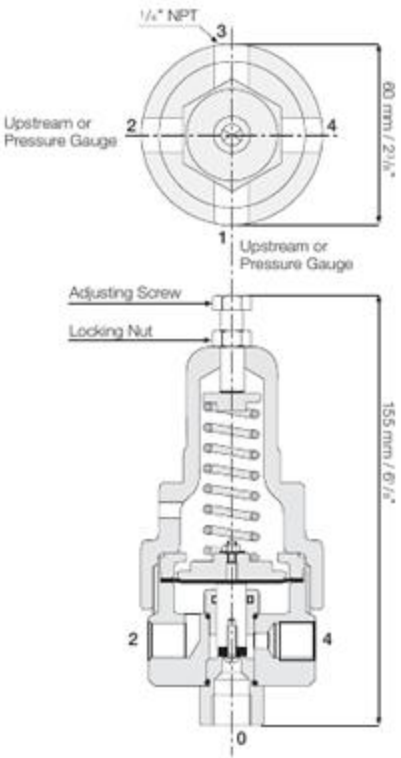
- Internal restriction
- Direct pressure gauge installation

Application

Pressure relief valve quick type sizes 1¹/₄-4"

Technical data

Pressure Rating: 16 bar (230 psi)
Working Temperature: Water up to 80°C (180°F)
Flow Factor: Kv 0.75 (Cv 0.88)
Standard Materials:
Body & cover: Brass
Elastomers: NBR
Internals: Stainless Steel & Brass
Spring: Galvanized Steel.
Optional Materials:
Metal Parts: Stainless Steel
Elastomers: FPM (Viton®)



Adjustment Range

Spring	Pressure		
	bar	psi	
G	1-12	15-175	Standard
N	0.8-6.5	11-95	Optional

Connections

1 - Upstream or pressure gauge
2 - Upstream or pressure gauge
3 - Valve control chamber (when 4 is plugged)
4 - Valve control chamber (when 3 is plugged)
0 - Downstream

Weight: 1.0 Kg (2.2 lbs.)

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Pressure Reducing Pilot Valve

With Integral Needle Valve

This pilot integrates all principal functions of a 2-Way control circuit in a single assembly. It is a direct acting valve, actuated by a pressure responsive diaphragm, which tends to reach equilibrium with the set spring force. When used in a pressure reducing circuit, the pilot modulates closed as downstream pressure rises above set point. An integral needle valve acts as an upstream flow restrictor as well as a closing speed control.

Features

- Integral needle valve
- Internal or external pressure sensing
- Differential pressure sensing
- Direct pressure gauge installation

Typical Applications

- Pressure Reducing Valves sizes 6-14" (Standard model #2)
- Flow Control Valves sizes 6-14"
  (Modified to differential sensing #2-DR)
- Surge Anticipating Valves sizes 1½-4" as low pressure pilot
  (Modified to external pressure sensing #2-R)
- Surge control closing (additional feature 49) for sizes 6-14"
  (Modified to external pressure sensing #2-R)

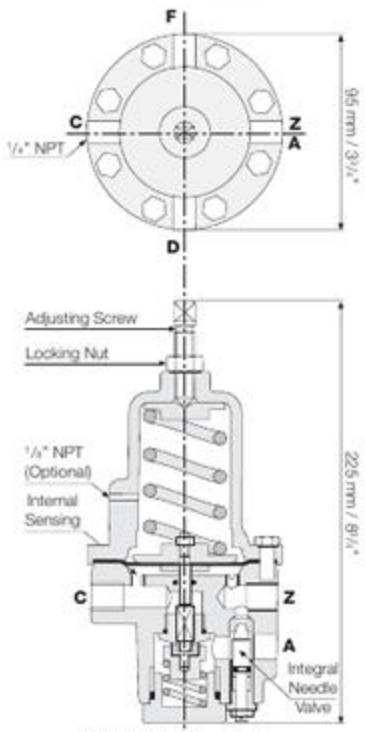
Technical Data

Pressure Rating: 40 bar (600 psi)
Working Temperature: Water up to 80°C (180°F)
Flow Factor: Kv 1.0 (Cv 1.2)
Standard Materials:
Body & cover: Brass
Elastomers: NBR
Internals: Stainless Steel & Brass
Spring: Galvanized Steel
Optional Materials:
Metal Parts: Stainless Steel, Nickel Aluminum Bronze, Hastalloy
Elastomers: FPM (Viton®)

Adjustment Range

Spring	Pressure		
	bar	psi	
16	1-16	15-230	
10	0.8-10	11-150	
16*	2-30	30-430	Standard
16*	2-45	30-650	Optional

* With high pressure setting kit



Weight: 2.7 Kg / 6 lbs.

* High pressure setting kit add 15 mm (5/8") to pilot height.

Connections

Z - Upstream **A** - Valve control chamber **C** - Downstream
F/D - External sensing/pressure gauge

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High Capacity Pressure Reducing Pilot Valve

This is a direct acting valve, actuated by a pressure responsive diaphragm, which tends to reach equilibrium with the set spring force. Fully balanced trim ensures high accuracy and stability.
When used in a pressure reducing circuit, the pilot modulates closed as downstream pressure rises above set point.

Features

- Internal or external pressure sensing
- Differential pressure sensing
- Direct pressure gauge installation

Typical Applications

- Pressure Reducing Valves sizes 16-32" (Standard model #2HC)
- Flow Control Valves sizes 16-32"
  (Modified to differential sensing #2HC-DR)
- Surge Anticipating Valves sizes 6-14" as low pressure pilot
  (Modified to external pressure sensing #2HC-R)
- Closing surge control (additional feature 49) for sizes 16-32"
  (Modified to external pressure sensing #2HC-R)

Technical data

Pressure Rating: 25 bar (350 psi)
Working Temperature: Water up to 80°C (180°F)
Flow Factor: Kv 4.4 (Cv 5.1)
Standard Materials:
Body: Bronze
Cover: Brass
Elastomers: NBR
Internals: Stainless Steel & Brass
Spring: Galvanized Steel
Optional Materials:
Metal Parts: Stainless Steel, Nickel Aluminum Bronze, Hastalloy
Elastomers: FPM (Viton®)

Adjustment Range

Spring	Pressure	
	bar	psi
16	1-16	15-230
10	0.5-10	11-150
25*	2-25	30-350

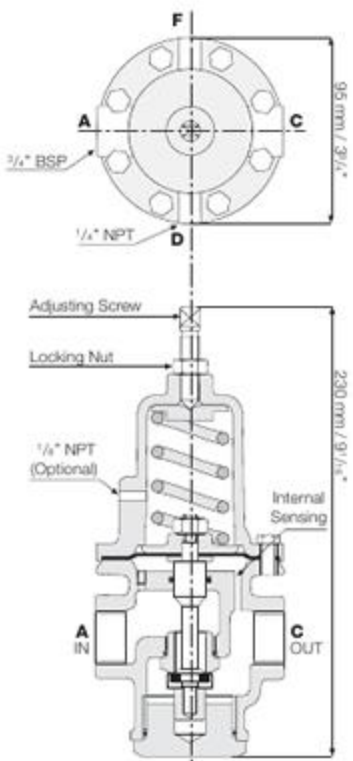
Standard
Optional

* With high pressure setting kit

Connections

A - Valve control chamber
C - Downstream
F/D - External sensing (optional) / pressure gauge

Upstream pressure is connected to valve control chamber via a restriction.



Weight: 3.4 Kg / 7.5 lbs.

* High pressure setting kit add 128 mm (5") to pilot height

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Pressure Reducing Pilot Valve

This is a direct acting valve, actuated by a pressure responsive diaphragm, which tends to reach equilibrium with the set spring force. Fully balanced trim ensures high accuracy and stability.
When used in a pressure reducing circuit, the pilot modulates closed as downstream pressure rises above set point.

Features

- Internal or external pressure sensing
- Differential pressure sensing
- Direct pressure gauge installation

Typical Applications

- Pressure reducing valves sizes 1¹/₂-10" (Standard model #2PB)
- Flow Control Valves sizes 1¹/₂-4"
  (Modified to differential sensing #2PB-D)
- Closing surge control (additional feature 49) for sizes 1¹/₂-10"
  (Modified to external pressure sensing #2PB-R)

Technical Data

Pressure Rating: 25 bar (350 psi)
Working Temperature: Water up to 80°C (180°F)
Flow Factor: Kv 0.46 (Cv 0.54)
Standard Materials:
Body: Bronze
Cover: Brass
Elastomers: NBR
Internals: Stainless Steel & Brass
Spring: Galvanized Steel
Optional Materials:
Metal Parts: Stainless Steel, Nickel Aluminum Bronze, Hastalloy
Elastomers: FPM (Viton®)

Adjustment Range

Spring	Pressure	
	bar	psi
M	1-16	15-230
N	0.5-6	7-90
J*	0.2 -1.7	3-25

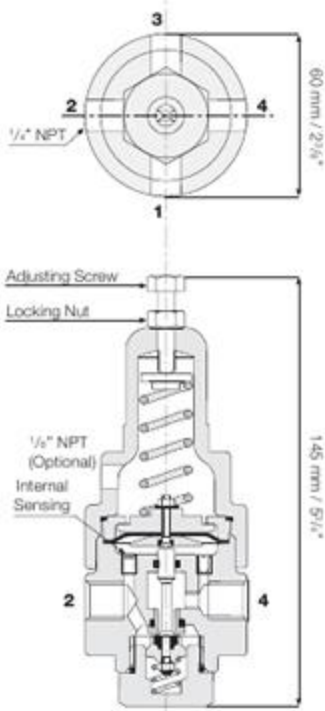
Standard
Optional

* For #2PB-D-differential sensing.

Connections

1 - Remote sensing (optional) or pressure gauge
2 - Downstream
3 - Remote sensing (optional) or pressure gauge
4 - Valve control chamber

* Upstream pressure is connected to valve control chamber via a restriction.



Weight: 1.5 Kg / 3.3 lbs.

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Pressure Sustaining Pilot Valve

With Integral Needle Valve

This pilot integrates all principal functions of a 2-Way control circuit in a single assembly. It is a direct acting valve, actuated by a pressure responsive diaphragm, which tends to reach equilibrium with the set spring force. When used in a pressure relief/sustaining circuit, the pilot modulates open as upstream pressure rises above set point.
An integral needle valve acts as an upstream flow restrictor as well as a closing speed control.

Features

- Integral needle valve
- Internal or external pressure sensing
- Differential pressure sensing
- Direct pressure gauge installation

Typical Applications

- Pressure Relief/Sustaining Valve sizes 6-14" (Standard model #3)
- Differential Pressure Sustaining Valve sizes 6-14" (Modified to differential sensing #3D)
- Surge Anticipating Valve sizes 1½-4" as high pressure pilot (Standard model #3)

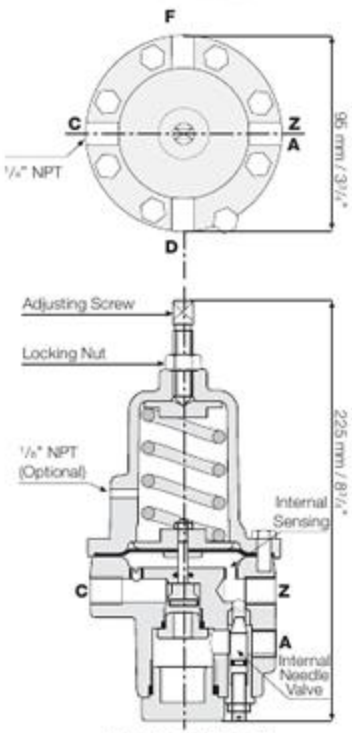
Technical Data

Pressure Rating: 40 bar (600 psi)
Working Temperature: Water up to 80°C (180°F)
Flow Factor: Kv 1.1 (Cv 1.3)
Standard Materials:
Body & cover: Brass
Elastomers: NBR
Internals: Stainless Steel & Brass
Spring: Galvanized Steel
Optional Materials:
Metal Parts: Stainless Steel, Nickel Aluminum Bronze, Hastalloy
Elastomers: FPM (Viton®)

Adjustment Range

Spring	Pressure		
	bar	psi	
16	1-16	15-230	
10	0.8-10	11-150	
16*	2-30	30-430	Standard
16*	2-45	30-650	Optional

* With high pressure setting kit



Weight: 2.7 Kg / 6 lbs.

* High pressure setting kit add 15 mm (⅝") to pilot height.

Connections

Z - Upstream
C - Downstream
A - Valve control chamber
F/D - External sensing/pressure gauge

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High Capacity Pressure Sustaining Pilot Valve

This is a direct acting valve, actuated by a pressure responsive diaphragm, which tends to reach equilibrium with the set spring force.
When used in a pressure relief/sustaining circuit, the pilot modulates open as upstream pressure rises above set point.

Features

- Internal or external pressure sensing
- Differential pressure sensing
- Direct Pressure gauge installation

Typical Applications

- Pressure Relief/Sustaining Valves sizes 16-32" (Standard model #3HC)
- Differential Pressure Sustaining 16-32" (Modified to differential sensing #3HC-DR)
- Surge Anticipating Valve sizes 6-14" as high pressure pilot (Modified to external pressure sensing #3HC-R)

Technical Data

Pressure Rating: 25 bar (350 psi)
Working Temperature: Water up to 80°C (180°F)
Flow Factor: Kv 4.7 (Cv 5.5)
Standard Materials:
Body: Bronze
Cover: Brass
Elastomers: NBR
Internals: Stainless Steel & Brass
Spring: Galvanized Steel
Optional Materials:
Metal Parts: Stainless Steel, Nickel Aluminum Bronze, Hastalloy
Elastomers: FPM (Viton®)

Adjustment Range

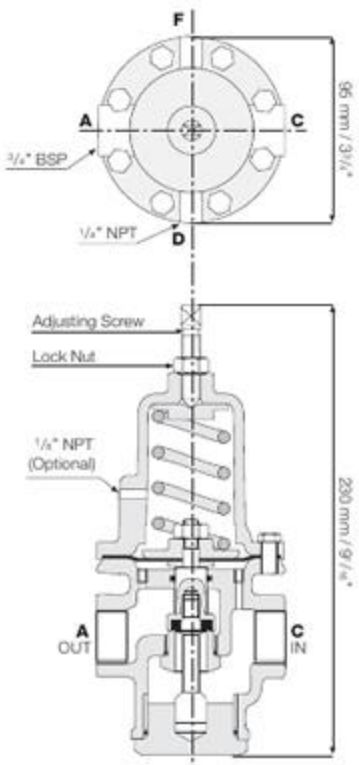
Spring	Pressure bar	Pressure psi	
16	1-16	15-230	Standard
10	0.8-10	11-150	Optional
25*	2-25	30-350	Optional

* With high pressure setting kit

Connections

C - Valve control chamber
A - Downstream
F/D - External sensing/pressure gauge

Upstream pressure is connected to valve control chamber via a restriction



Weight: 3.4 Kg / 7.5 lbs.

* High pressure setting kit add 128 mm (5") to pilot height.

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Pressure Sustaining Pilot Valve

This is a direct acting valve, actuated by a pressure responsive diaphragm, which tends to reach equilibrium with the set spring force.
When used in a pressure relief/sustaining circuit, the pilot modulates open as upstream pressure rises above set point.

Features

- Internal or external pressure sensing
- Differential pressure sensing
- Direct pressure gauge installation

Typical Applications

- Pressure relief/sustaining valve sizes 1½-4" (Standard model #3PB).
- Differential Pressure sustaining valve sizes 1½-4" (Modified to differential sensing #3PB-D)

Technical Data

Pressure Rating: 25 bar (350 psi)
Working Temperature: Water up to 80°C (180°F)
Flow Factor: Kv 0.48 (Cv 0.56)
Standard Materials:
Body: Bronze
Cover: Brass
Elastomers: NBR
Internals: Stainless Steel & Brass
Spring: Galvanized Steel
Optional Materials:
Metal Parts: Stainless Steel, Nickel Aluminum Bronze, Hastalloy
Elastomers: FPM (Viton®)

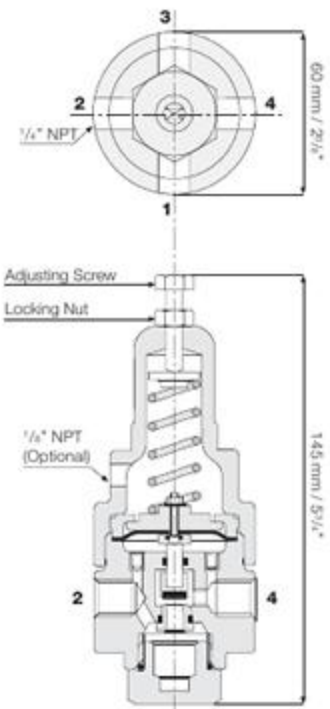
Adjustment Range

Spring	Pressure		
	bar	psi	
M	1-16	15-230	
N	0.8-6.5	11-95	Standard
J	0.2-1.7	3-25	Optional

Connections

1 - Remote sensing or pressure gauge
2 - Valve control chamber
3 - Remote sensing or pressure gauge
4 - Downstream

* Upstream pressure is connected to valve control chamber via a restriction.



Weight: 1.5 Kg / 3.3 lbs.

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Altitude Positioning Pilot Valve

This high sensitivity, direct acting, 3-Way positioning pilot is actuated by a pressure responsive diaphragm, which tends to reach equilibrium with the set spring force.

The pilot directs flow and pressure between its ports:
- When sensed pressure is above set point, it connects port "C" to "0"
- When sensed pressure is equal to set point, it blocks connections between all ports
- When sensed pressure is below set point, it connects port "C" with "A" and "Z"

An integral needle valve restricts flow through port "Z"

Technical Data

Pressure Rating: 16 bar (230 psi)
Working Temperature: Water up to 80°C (180°F)
Flow Factor:
Closing (0 to C): Kv 0.26 (Cv 0.3)
Opening (C to A): Kv 0.35 (Cv 0.4)
Standard Materials:
Body & cover: Brass
Diaphragm Covers: Fusion bonded epoxy coated steel
Elastomers: NBR
Internals: Stainless Steel & Brass
Spring: Galvanized Steel
Optional Materials:
Metal Parts:
Stainless Steel, Nickel Aluminum Bronze, Hastalloy
Elastomers: FPM (Viton®)

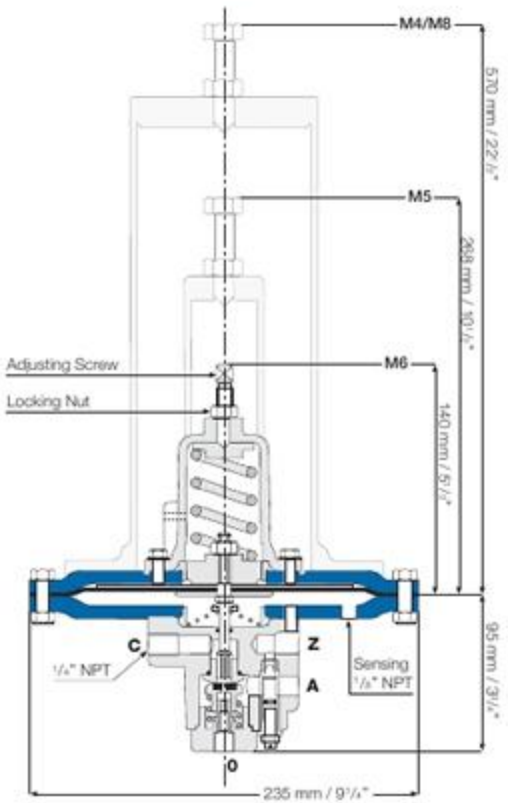
Adjustment Range

Code	Pilot	
	Meter	Feet
M6	2-14	7-46
M5	5-22	17-72
M4	15-35	49-115
M8	25-70	82-230

Standard
Optional

Connections

0 - Upstream
C - Valve control chamber
A - Vent (**Z** plugged)
Z - Through needle valve (**A** plugged)
Sensing - Still point at reservoir bottom



Weights: M6 -10 Kg / 22 lbs. M5 -11 Kg / 24 lbs.
M4 -19 Kg / 42 lbs. M8 -22 Kg / 49 lbs.

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High Sensitivity Pressure Reducing Pilot Valve

This pilot integrates all principal functions of a 2-Way control circuit in a single assembly.
It is a high sensitivity, direct acting valve, actuated by a pressure responsive diaphragm, which tends to reach equilibrium with the set spring force.
When used in a pressure reducing circuit, the pilot modulates closed as downstream pressure rises above set point. An integral needle valve acts as an upstream flow restrictor as well as a closing speed control.

Features

- Integral needle valve
- Differential pressure sensing (model #7)

Typical Applications

- Modulating Altitude Control Valves sizes 1¹/₂-14"
- High Sensitivity Pressure Reducing Valves sizes 1¹/₂-14"
- Low ΔP Flow Control Valves sizes 1¹/₂-14"
  (modified to differential sensing model #7)

Technical Data

Pressure Rating: 16 bar (230 psi)
Working Temperature: Water up to 80°C (180°F)
Flow Factor: Kv 1.0 (Cv 1.2)
Standard Materials:
Body & cover: Brass
Diaphragm Covers: Fusion bonded epoxy coated Steel
Elastomers: NBR
Internals: Stainless Steel & Brass
Spring: Galvanized Steel
Optional Materials:
Metal Parts:
Stainless Steel, Nickel Aluminum Bronze, Hastalloy
Elastomers: FPM (Viton®)

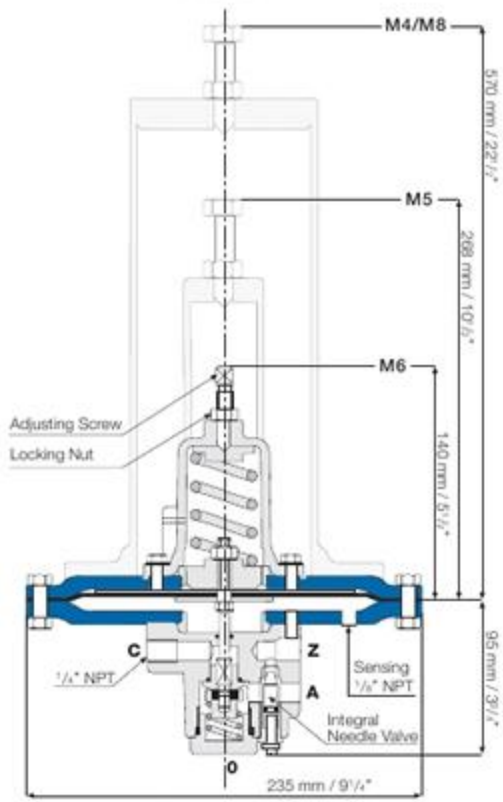
Adjustment Range

Code	Pilot	
	Meter	Feet
M6	2-14	7-46
M5	5-22	17-72
M4	15-35	49-115
M8	25-70	82-230

Standard
Optional

Connections

Z - Upstream
A - Valve control chamber
C - Downstream
Sensing - For altitude control – still point at reservoir bottom
For pressure reducing – to valve downstream



Weights: M6 -10 Kg / 22 lbs. M5 -11 Kg / 24 lbs.
M4 -19 Kg / 42 lbs. M8 -22 Kg / 49 lbs.

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High Sensitivity Pressure Sustaining Pilot Valve

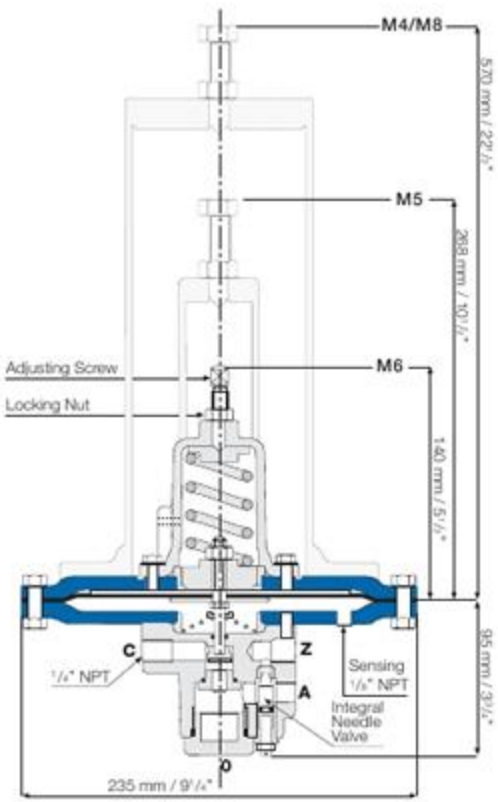
This pilot integrates all principal functions of a 2-Way control circuit in a single assembly.
It is a high sensitivity, direct acting valve, actuated by a pressure responsive diaphragm, which tends to reach equilibrium with the set spring force.
The pilot modulates open as upstream pressure rises above set point. An integral needle valve acts as an upstream flow restrictor as well as a closing speed control.

Typical Applications

- Modulating Altitude Level Control Valves (at reservoir outlet) sizes 1¹/₂-14"
- High Sensitivity Pressure Sustaining Valves sizes 1¹/₂-14"

Technical Data

Pressure Rating: 16 bar (230 psi)
Working Temperature: Water up to 80°C (180°F)
Flow Factor: Kv 1.1 (Cv 1.3)
Standard Materials:
Body & cover: Brass
Diaphragm Covers: Fusion bonded epoxy coated Steel
Elastomers: NBR
Internals: Stainless Steel & Brass
Spring: Galvanized Steel
Optional Materials:
Metal Parts: Stainless Steel, Nickel Aluminum Bronze, Hastalloy
Elastomers: FPM (Viton®)



Adjustment Range

Code	Pilot	
	Meter	Feet
M6	2-14	7-46
M5	5-22	17-72
M4	15-35	49-115
M8	25-70	82-230

Standard
Optional

Connections

Z - Upstream
A - Valve control chamber
C - Downstream
Sensing - For altitude control – still point at reservoir bottom
For pressure sustaining – to valve upstream

Weights: M6 -10 Kg / 22 lbs. M5 -11 Kg / 24 lbs.
M4 -19 Kg / 42 lbs. M8 -22 Kg / 49 lbs.

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Positioning Pilot Valve

This multi-purpose, direct acting, 3-Way positioning pilot is actuated by a pressure responsive diaphragm, which tends to reach equilibrium with the set spring force.

The pilot directs flow and pressure between its ports:
- When sensed pressure is above set point, it connects port "C" to "0".
- When sensed pressure is equal to set point, it blocks connections between all ports.
- When sensed pressure is below set point, it connects port "C" with "A" and "Z". An integral needle valve restricts flow through port "Z".

Typical Applications

- Pressure Reducing Valves (Type X) sizes 1¹/₂-10"
- Pressure Sustaining Valves (Type X) sizes 1¹/₂-10"
- Adjustable hydraulic relay (N.O. or N.C.)
- Automatic regulation override (feature 09) sizes 1¹/₂-10"

Technical Data

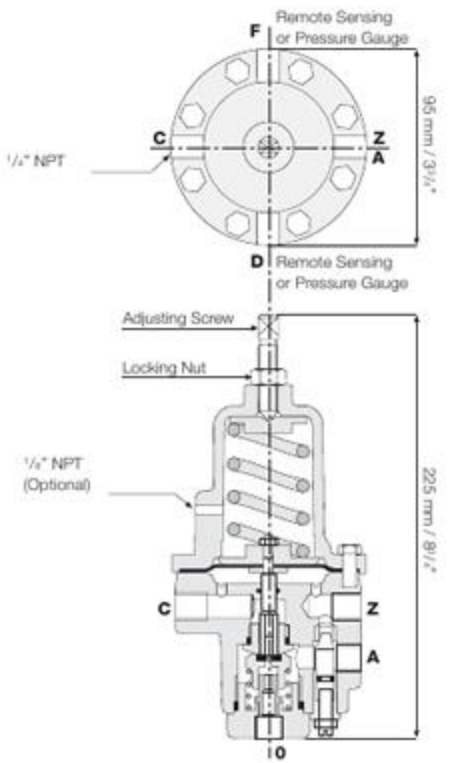
Pressure Rating: 25 bar (350 psi)
Working Temperature: Water up to 80°C (180°F)
Flow Factor:
Closing (0 to C): Kv 0.26 (Cv 0.3)
Opening (C to A): Kv 0.35 (Cv 0.4)
Standard Materials:
Body & cover: Brass
Elastomers: NBR
Internals: Stainless Steel & Brass
Spring: Galvanized Steel
Optional Materials:
Metal Parts: Stainless Steel, Nickel Aluminum Bronze, Hastalloy
Elastomers: FPM (Viton®)

Adjustment Range

Spring	Pressure		
	bar	psi	
16	1-16	15-230	Standard
10	0.8-10	7-150	Optional

Connections

0 - Upstream for reducing, vent for sustaining
C - Valve control chamber
A/Z - Vent for reducing, upstream for sustaining
F/D - Sensing/pressure gauge



Weight: 2.7 Kg / 6 lbs.

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Pitot Tube

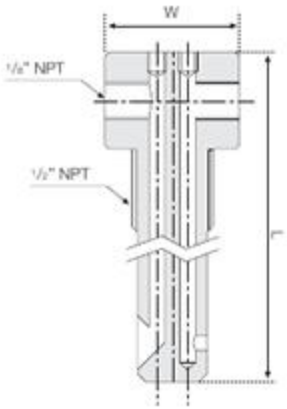
When a pitot tube is used as an integral part of a flow control valve control circuit, it provides the differential pressure (ΔP) to power the flow control pilot. A pitot tube flow sensor is recommended for applications where low head loss is essential and required flow is relatively high.
Due to its low ΔP output, a flow control valve with pitot tube (Model 770-j) should employ a high sensitivity pilot.

Technical Data

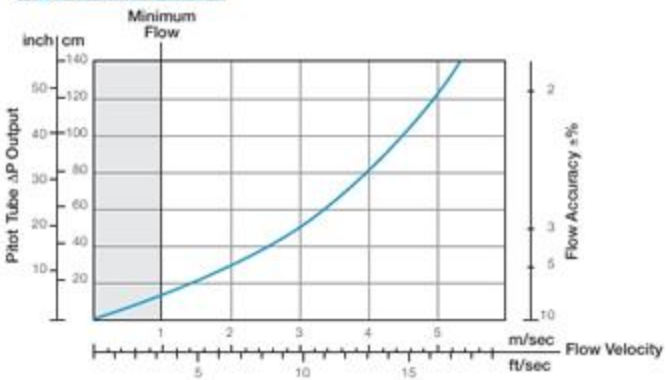
Material: Brass or Stainless Steel
Sensing ports: 1/8" NPT
Minimum flow velocity: 1.0 m/sec (3.3 ft/sec)

Dimensions

Size		L		W	
mm	inch	mm	inch	mm	inch
50-80	2-3	85	3 3/8	30	1 3/16
100-300	4-12	115	4 1/2	30	1 3/16
350-500	14-20	220	8 11/16	30	1 3/16



Hydraulic Chart



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