

# Control Valves 700

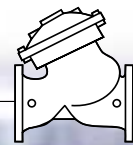


# BERMAD

Hydraulic Control Valves

700 Series





## Control Valves

### **BERMAD 700 SERIES CONTROL VALVES IN WATERWORKS APPLICATIONS**

Waterworks is that segment of **BERMAD**'s activities that are associated with water supply and distribution system applications.

The heart of **Waterworks** is the **BERMAD** 700 Series control valves. These optimally-engineered valves, developed by the dedicated staff of **BERMAD** engineers, using the latest technology, encompass models and configurations to answer national, regional, and municipal water supply, as well as industrial needs and high rise buildings. The information provided here is intended for and will be of particular interest to project investors, consulting engineers, construction supervisors, installation contractors, and service personnel.

To serve the needs of the multitude of projects, for which water supply, distribution and utilization are integral components, the **BERMAD** 700 Series control valves provide a variety of individual and combined functions, such as:

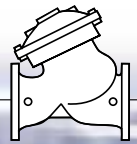
- Pressure reducing
- Pressure relief & sustaining
- Flow control
- Level control
- Pump control
- Surge control
- Solenoid control
- Electronic control
- Burst control

The basic valve design (globe or angle) results in lower pressure loss, reduced weight, and higher resistance to cavitation damage compared to that of a conventional control valve.

Each valve is available in sizes 1/2" - 32" (40-800 mm), threaded or flanged, with pressure ratings up to ANSI Class 300 psi (ISO 25). The valves are hydraulically operated by means of diaphragm actuators, (except for high-pressure application piston actuators). Principally, the valves are constructed of ductile cast iron or steel (optional: other alloys) and are available with various protective coatings.

**BERMAD** is one of the world leaders in the sale of control valves by virtue of its success in 86 countries. **BERMAD** currently holds a major worldwide market share in North and South American, European, Asian countries, and Australia, who contribute the most to our project portfolio.

**BERMAD** and its staff have developed in an environment that demanded a fierce respect for the conservation and management of water resources. This respect has been translated into an attitude that results in products and services of the highest quality, versatility, and efficiency. Due to this dedication, **BERMAD** today is a world leader in its field, enjoying a global presence on each continent and in most countries.



## 700 Basic Valve

The Model 700/705 Basic Hydraulic Valve is a diaphragm-actuated, hydraulically-operated, globe valve in either the oblique (Y) or angle pattern design. The 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 a single item. The actuator assembly includes both a lower and an upper control-chamber. By removing or inserting the lower chamber separating partition orifice plugs, the basic valve can be configured either as a single-chamber control valve (Model 705), or a double-chamber control valve (Model 700), respectively. The diaphragm sub-assembly, in both single and double-chambered versions are center-guided, providing a seat area without obstructions.

The Model 700 Basic Valve operation is independent of valve differential pressure. The double-chambered diaphragm actuator is always subjected to full differential pressure to develop maximum power and to respond immediately. The upper control-chamber is pressurized to close and vented to open the valve.

The lower control-chamber usually is vented to the atmosphere, but can be pressurized to power the valve open.

The Model 705 Basic Valve uses differential pressure to power the diaphragm actuator open or closed. The lower control-chamber is exposed to the downstream pressure, that serves to cushion the closing of the valve, 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.

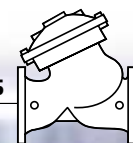
This varying pressure modulates the valve to open or close.

The Model 700/705 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 Series applications.



## Basic Valve





### Product Features

700 Series

#### Double Chambered Actuator

The entire actuator assembly (seal disk to top cover) can be easily removed from the valve body as one complete unit, providing ease of inspection and maintenance.

#### Cover Plug

Enables on-site retrofit of:

**Indicator:** For visual valve opening indication

**Micro-switch:** For signaling valve position to control system

**Valve Position Transmitter:** For analog transmission of valve position to control system

#### Diaphragm Assembly

The unshaped, nylon re-enforced, diaphragm is supported by the cover and separation partition on its circumference while the diaphragm washers provide full support over the majority of the surface. It is centrally guided. Diaphragm load is limited to only stretching forces applied to the active area.

#### Inherent Separation Partition

The built-in separation includes the bearing which provides complete central guiding for the valve moving assembly.

In the double chambered configuration, isolates the lower control chamber from the flow.

In the single chambered configuration, separates the lower control chamber from the flow so that the diaphragm is protected and free from flow stresses.

#### Spring

Optional for single-chambered configurations or when the check feature is required.

Superfluous for double-chambered configurations.

#### Seal Disc 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.

#### Wide Body ("Y" or Angle pattern)

Hydrodynamically 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 ordinary globe valves.

#### Seat

Stainless steel, raised, replaceable in-line and on-site

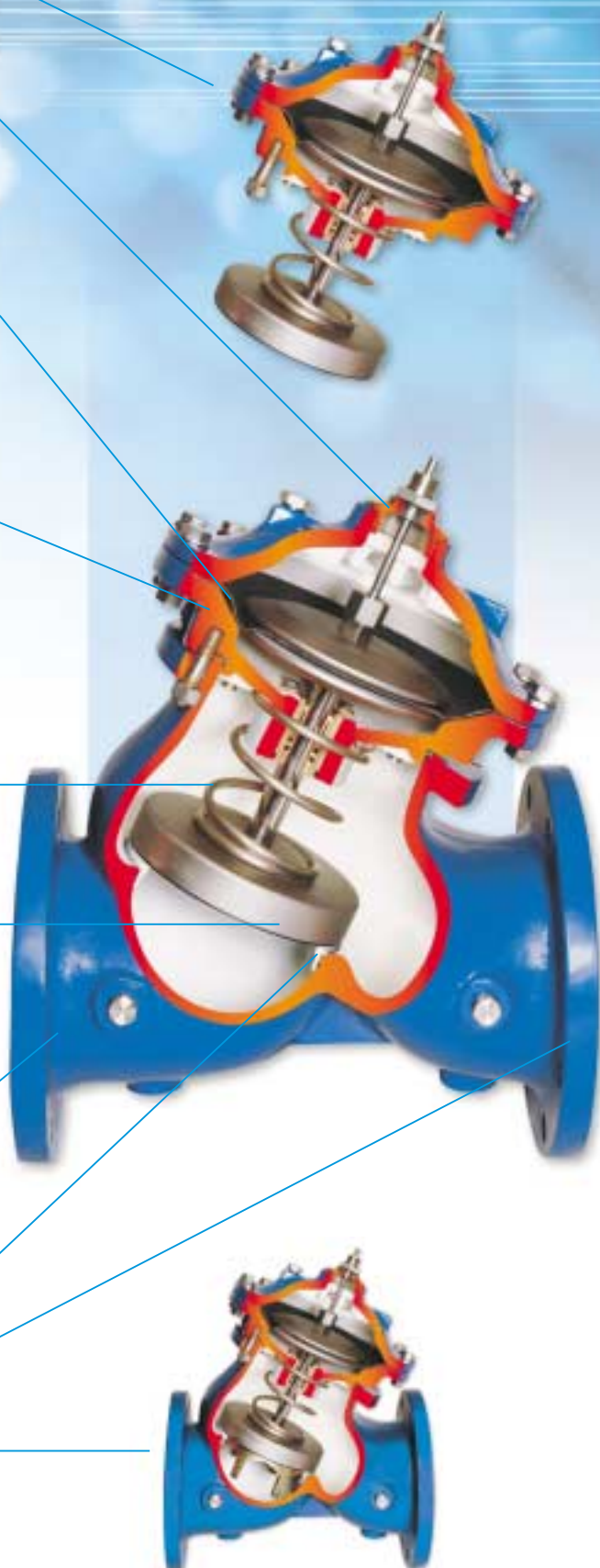
#### End Connections

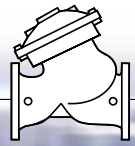
Conforms to pressure ratings and standards of: ISO, ANSI, JIS, BS, and others.

#### 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.

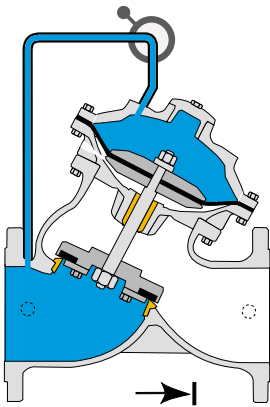




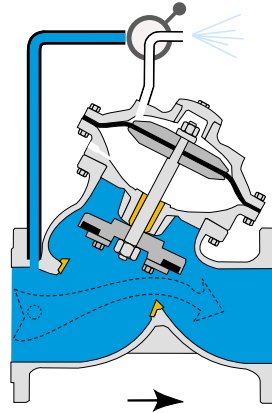
### Principal of Operation

### 700 Series

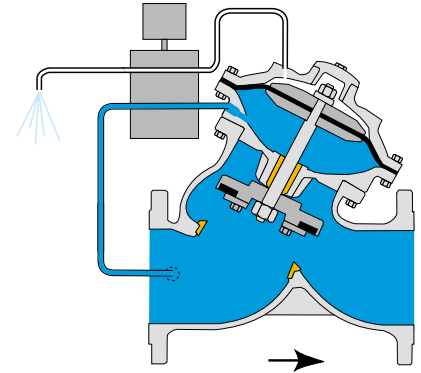
#### On-Off Modes



**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.



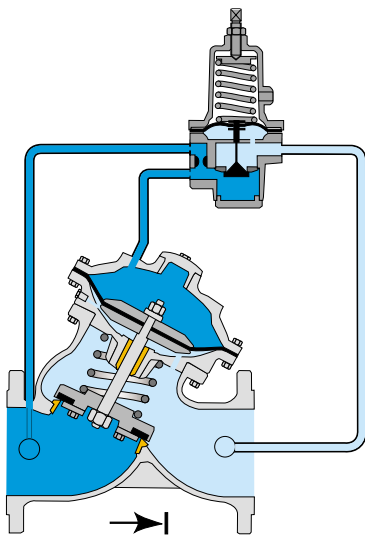
**Open Position**  
Discharging the pressure in the upper control chamber to atmosphere or some other lower pressure zone causes the line pressure acting on the seal disc to move the valve to the open position.



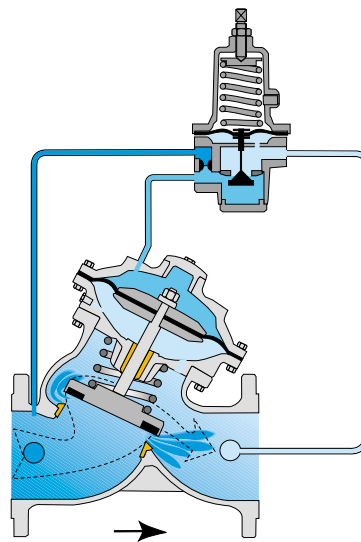
**Powered Open Position**  
Pressure in the upper control chamber is discharged and line pressure is applied to both the lower control chamber and the seal disc. This creates a force that powers the valve to the open position.

#### Modulating Mode

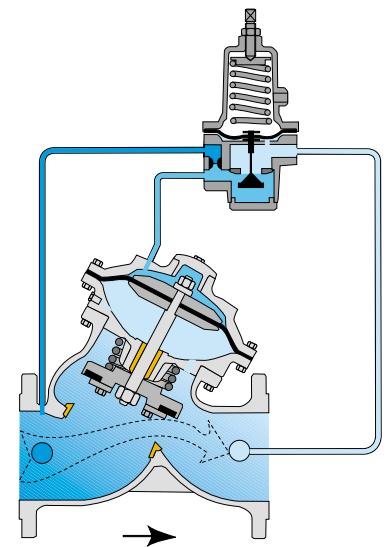
#### Pressure Reducing Models



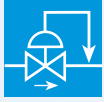
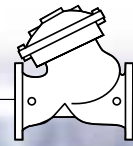
**Closed Position**  
The closed adjustable pilot valve traps line pressure in the upper control chamber and the resulting force moves the valve to the fully closed position.



**Modulating Position**  
The pilot valve senses and reacts to line pressure changes and opens or closes accordingly. The pilot valve controls the pressure in the upper control chamber of the valve causing the valve to modulate to an intermediate position between fully open and closed.



**Modulating Open Position**  
The open pilot valve releases line pressure from the upper control chamber and the line pressure acting on the seal disc moves the valve to the open position.



## 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.

### Model 720

#### Applications

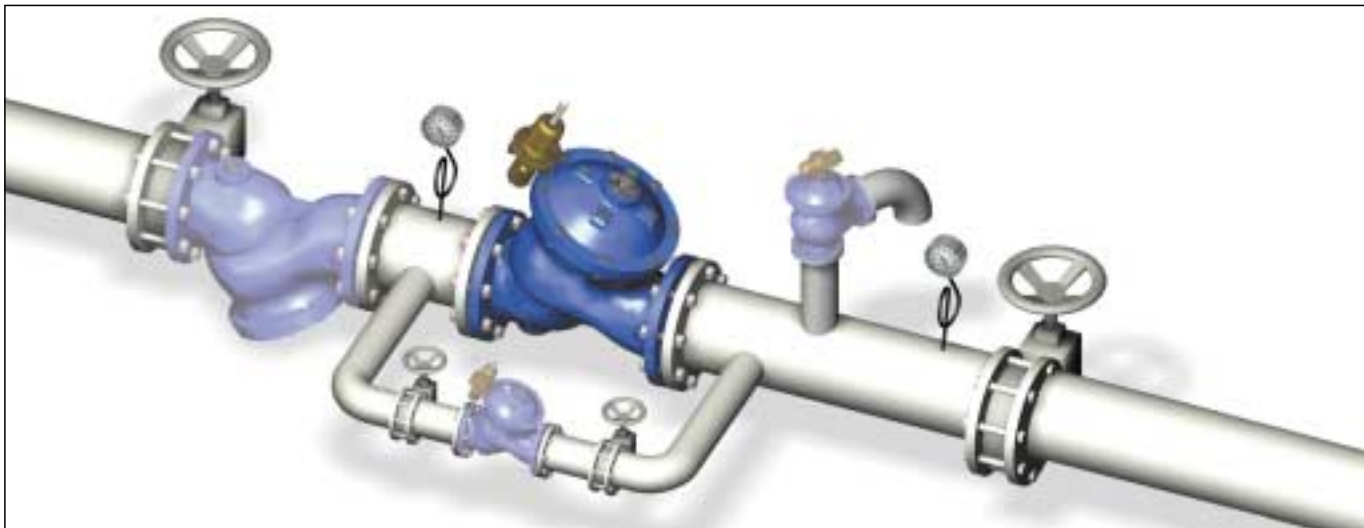
- Flow and leakage reduction
- Cavitation damage protection
- Throttling noise reduction
- Burst protection
- System maintenance savings

#### Features and Benefits

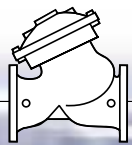
- Line-pressure driven – independent operation
- In-line serviceable – easy maintenance
- Double chamber design
  - Moderated valve reaction
  - Protected diaphragm
- Flexible design – easy addition of features
- Variety of accessories – perfect mission matching
- "Y" or angle, wide body – minimized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



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.







## Pressure-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, preventing line emptying & pump overload, etc.

### Model 730

#### Applications

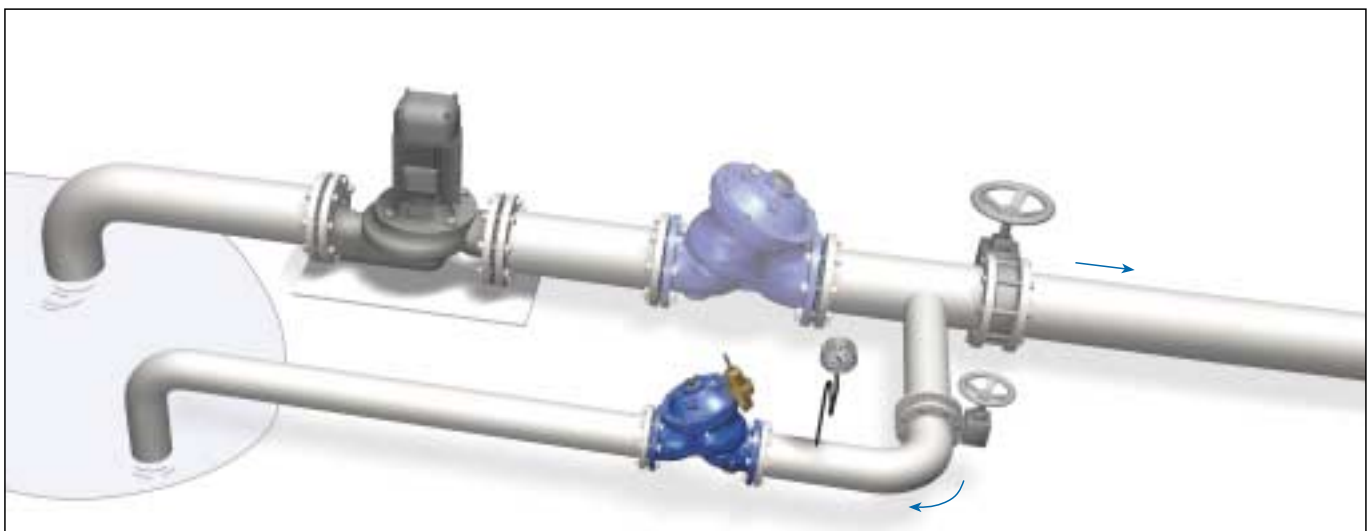
- Prioritizing pressure zones
- Ensuring controlled pipeline fill-up
- Preventing pipeline emptying
- Pump overload & cavitation protection
- Safeguarding pump minimum flow
- Excessive line-pressure protection

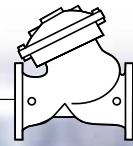
#### Features and Benefits

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



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.





## Level Control Valve with Float Pilot

Float controlled valves combine the advantages of excellent hydraulic control valves with the simplicity of mechanical floats. The ability to separate the main valve from the float enables eliminating most of the installation and maintenance problems associated with mechanical float valves.

The wide selection of float pilot types makes Float Control Valves the solution wherever level control is required.

### Model 750-66-B

#### Applications

- Reservoir filling
- Very low supply-pressure
- Low noise generation
- Energy cost-critical systems
- Reservoir outlet-Distribution routing

#### Features and Benefits

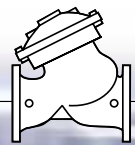
- **Line-pressure driven** – independent operation
- **Bi-level hydraulic float control**
  - On/Off service
  - Low cavitation damage
  - Inherent reservoir refreshing
- **Double chamber**
  - Full-powered opening & closing
  - Decreased pressure loss
  - No throttling noise
  - Non-slam closing characteristic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



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.







## Level Control Valve with Altitude Pilot

Water tanks, water towers, and existing reservoirs are some examples of places where level control is required but arrangements for installation of a float pilot is complicated and expensive.

For these reservoirs, the Level Control Valves with Altitude Pilot saves the need for internal float installation while retaining simplicity & reliability for wide selection of applications.

**Model 750-80-X  
(780-X)**

### Applications

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

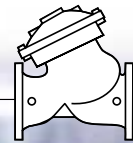
### Features and Benefits

- **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



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.





## Booster Pump Control Valves

Pump Control Valves protect pumps, pipe-lines, and other system components by isolating the pipeline from the sudden velocity changes associated with pump starting and stopping. The “Active Check Valve” logic of operation, is the method of pumping-system control that prevents surges rather than eliminating them.

### Model 740

#### Applications

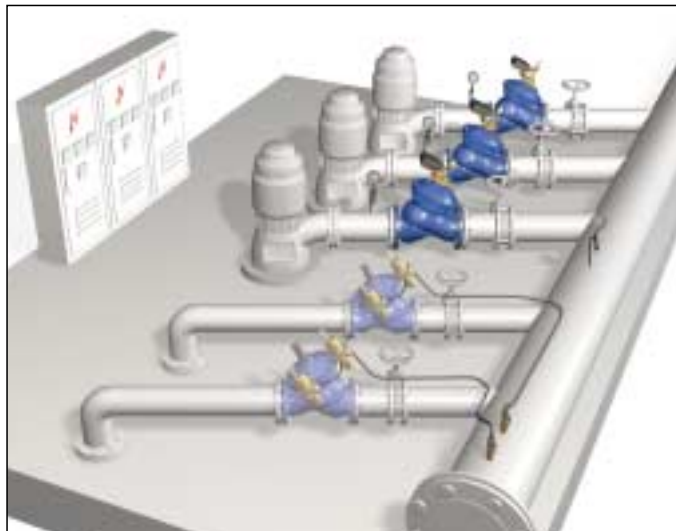
- Isolation of pump start and stop effects from system, for:
  - Solitary single speed pumps
  - Battery of single speed pumps (add & switch)
  - Battery of variable speed pumps (add)

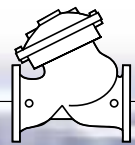
#### Features and Benefits

- 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”) & closing
  - Non-slam opening & closing characteristic
  - Protected diaphragm
- Balanced seal disk – high flow capacity
- Flexible design – easy addition of hydraulic features



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.





## 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.

### Applications

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

### Features and Benefits

- Replaces surge air vessels
  - Relieves surge, fail-safe open
  - Minimal maintenance
  - Economy of space
  - Lower cost of ownership
  - 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

### Model 735

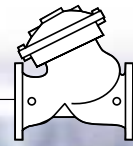


The Model 735-M Surge-Anticipating Valve is an off-line, hydraulically-operated, diaphragm-actuated valve. The valve, sensing line pressure, opens in response to the pressure drop associated with abrupt pump stoppage. The pre-opened valve dissipates the returning high pressure wave, eliminating the surge.

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.







## 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 or downstream pressure.

### Model 770-U

#### Applications

- Securing design specifications
- Prioritizing main system over sub-system
- Limiting consumers over-demand
- Controlling pipeline fill-rate
- Pump overload & cavitation protection

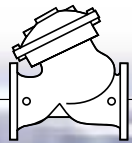
#### Features and Benefits

- **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
- **St. Steel raised seat** – cavitation damage resistant
- **Obstacle-free full-bore** – uncompromising reliability
- **V-Port Throttling Plug** – low-flow stability



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.





## Burst Control Valve

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

### Model 790-M

#### Applications

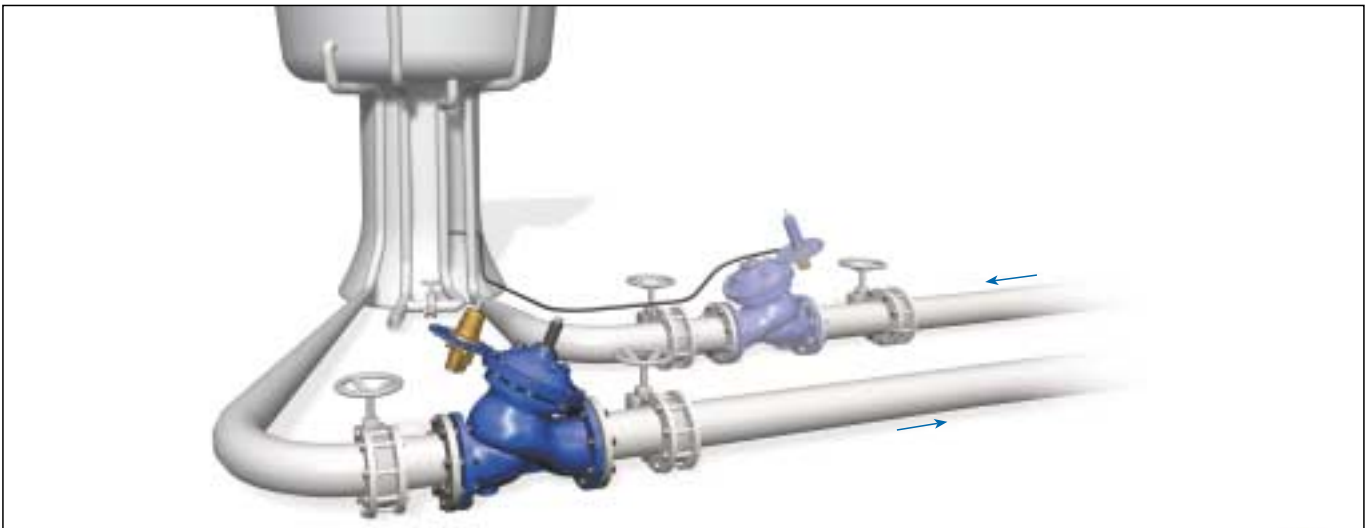
- Zonal shut-off at burst
- "Older" burst-susceptible networks
- Outlets from reservoir at earthquake risk
- Vulnerable network infrastructure facilities
- Networks liable to mechanical damage

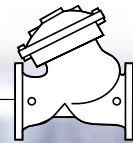
#### Features and Benefits

- Line-pressure driven – independent operation
- Mechanical flow stem
  - Field adjustable
  - No moving parts
  - No electronic components
- Highly-sensitive hydraulic pilot
  - Requires minimal valve- $\Delta P$
  - 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



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.





## Solenoid-Controlled Valves

Solenoid Control 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, pressure, level or flow transmitters, etc.

### Model 710

#### Applications

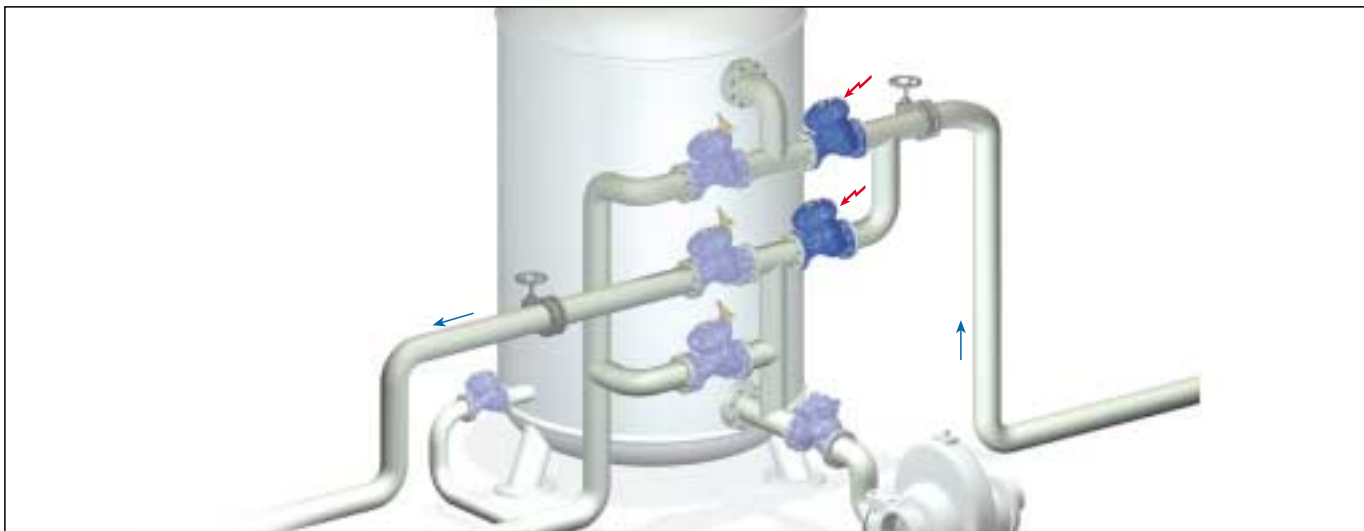
- Network management optimizing
- Pressure-zone isolating
- Burst excess-flow shut-off
- Reservoir overflow safety back-up
- Switching between "on-duty" valves
- Automatic refreshing of reservoirs

#### Features and Benefits

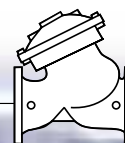
- **Line-pressure driven**
  - Independent operation
  - No motor required
  - Long-term drip-tight sealing
- **Solenoid-controlled**
  - Low power consumption
  - Low cost wiring
  - Wide ranges of pressures and voltages
  - Normally Open, Normally Closed or Last Position
- **In-line serviceable** – 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



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 & Closing Model 710-B.







## 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 temperature and/or other parameters requiring control. These valves combine the advantages of an excellent modulating, line-pressure driven, hydraulic valves and the sophistication and numerous possibilities of programmable electronic controls.

### Model 718-03

#### Applications

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

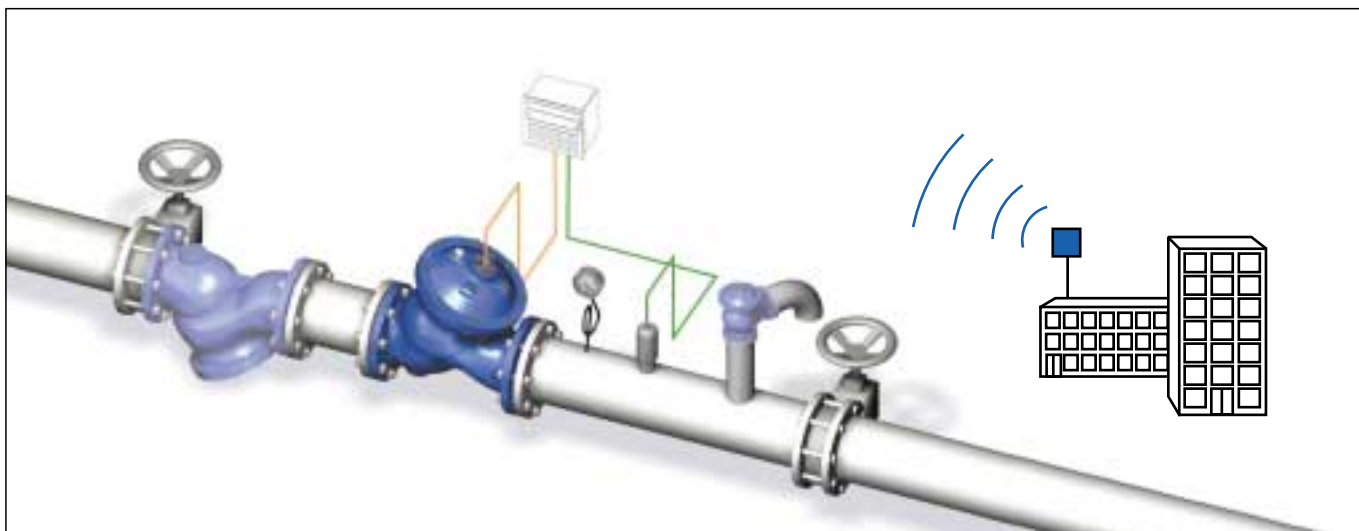
#### Features and Benefits

- Line-pressure driven – independent operation
- Solenoid-control
  - 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") & closing
  - Non-slam closing characteristic
  - Protected diaphragm
- Semi-straight flow – smooth flow characteristics
- St. Steel raised seat – cavitation damage resistant
- V-Port Throttling Plug – low-flow stability
- Flexible design – easy addition of features



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 (optional) BERMAD BE electronic controller according to the set values programmed into the controller.

For very low pressure applications, refer to the full-powered opening & closing – 718-03-B



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# BERMAD Worldwide

BERMAD Worldwide

With representation on every continent and across some 86 countries, BERMAD is an undisputed world leader in control valves, maintaining a broad training network and parts distribution all over the globe. No matter what the location, BERMAD is there.

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