

Irrigation

Irrigation for Agriculture

BERMAD Irrigation

Hydraulic Control Valves



BERMAD Irrigation

About this Catalog

BERMAD Catalog

This catalog presents a broad overview of the BERMAD main product lines for irrigation projects. With irrigation representing its earliest challenge and serving as the springboard for development into other areas, BERMAD's irrigation products are the culmination of years of hands-on experience, while reflecting BERMAD's cumulative engineering and marketing savvy. Over the years BERMAD has expanded both its manufacturing and its R&D capabilities in order to meet every market need, resulting in the development and marketing of no less than twelve different product lines. In order to make it easier to choose the best possible product for each specific need, this catalog focuses on the 100, 400 & 900 Series product lines, presenting detailed and clear guidelines.

Unique in its approach the Catalog is organized from the viewpoint of the irrigation project designer, from the laterals to the water source. Products are subsequently divided into four main chapters based on the location of each system in the irrigation project:

- **Main Network** – This is the part of the project that pertains to the water source and includes major system components such as booster and deep well pump stations, reservoirs, main supply lines, pressure and flow control devices, etc.
- **Irrigation Control Head** – Here the water supply system is transformed to an Irrigation System. These Irrigation Centers include various types of large size control valves in a variety of applications.
- **Infield Head-Works** – Located on the Riser Lines at the entrance from the supply network to the distribution lines the Infield Head-Works serves as the system control of the water's final exit through the emitters. It includes various types of electric or hydraulic on/off remote control valves, which suit a variety of pressure and flow control applications.
- **Infield System** – These models are applied directly to the distribution lines of systems that require additional control such as systems irrigated by non-compensated emitters, systems with high elevation differential, systems with turbid water, sloppy margin systems, etc. Some of the most common components of Infield System are: Pressure Reducers, Anti-Drain Valves and Flush-'n-Stop Valves.

In addition the catalog also includes two more chapters:

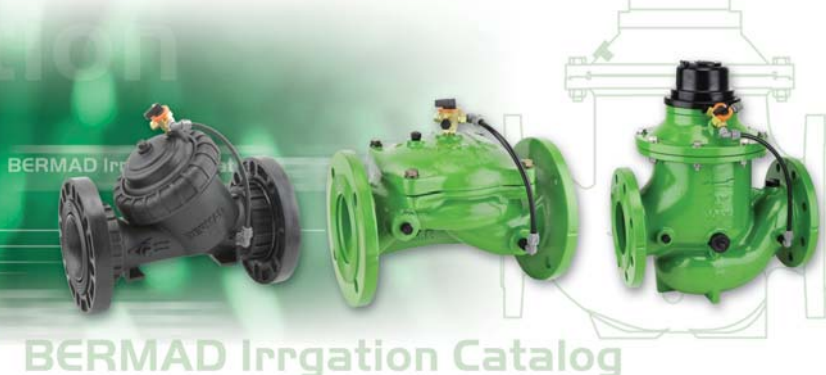
- **Engineering** – A comprehensive technical section presents the updated relevant information about the BERMAD Series.
- **Accessories** – Presents full information about BERMAD's control accessories and system components.

The full range of control valves for the irrigation market is so extensive that we have confined ourselves in this catalog to a select number of models. Contact your BERMAD representative for information on additional models.

Despite our efforts to achieve perfection, if any errors have crept into the catalog, we would appreciate receiving your feedback.

All the Photos, Applications and Operation Drawings in this Catalog are for Illustration purpose. The information herein is subject to change without notice.

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BERMAD Company Profile

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Helping control 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:

Irrigation

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

Waterworks

BERMAD offers systems for water and wastewater supply and treatment facilities ranging from municipalities, high-rise buildings, to whole industrial water systems, hydroelectric power stations and private sector projects.

Fire Protection

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

Petroleum

Automatic, self-actuated control valves for the petroleum industry, implemented 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 remote water metering read-out and pre-payment systems.



BERMAD Company Profile

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 contribution on the world arena, BERMAD has taken part in numerous major projects.



Irrigation Project References:



Italy - Carboj, Sicily

- Pumping “Arancio lake” water, supplying it to reservoirs on a mountain & irrigating 25000 Ha of various crops
- 6 units 18”-740, 4 units 8”-735, 1,000 units 3-8” hydrometers, and 20,000 units of various control valves
- BERMAD Italy, 1992



Italy - Iter, Sicily

- Infrastructure for new farming.
- 7,000 3” 310 valves with RTU, 2.8 M\$ for BERMAD valves and Motorola controllers
- One of the biggest projects in Sicily
- BERMAD Italy, 2002-2005



Spain - Aquifer 23 & 24

- Controlling 10,000 private farmers pumping from the same aquifer by hydrometers 927
- More then 1.7 M\$ through the years 1995-1998
- Uralita Tuberias De Systemas



Japan - Miyako

- Head works of small plots for vegetable private growers
- 2800 units 900-D AMV’s, estimated total project - 750 K\$
- Government financed project
- E.S. Water Net, 2002-2003



Brazil - Fischer Cargill S.A

- Full irrigation system for 1377 hectare of citrus new plantation
- 24 units 6” pump control valves, and more then 200 units 3” PRV's
- Total project: 1.2 M\$ BERMAD part: 250 K\$,
- BERMAD Brazil & Irrigarplan, 2001-2002



Argentina - Rio Colorado

- Water carrier for irrigation
- 90 units 3”, 4”, 6” models 720, 727-55, 718-03, 73Q & 0710-03
- The biggest project in the province of Neuquen, Argentina
- Techint Skanska S.A.

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USA - Salt Water Intrusion / Irrigation Project, Monterey, California

- Artichoke and Strawberry irrigation
- 20 units 6" & 8" 772-55 controlling the head works of the farms
- BERMAD USA



China - Yangze River

- Irrigation of new plantation from the flood of the three gorges dam
- More than 250 valves 4"-8" 420, first phase of one of the biggest projects in the world
- BERMAD China & Netafim



Israel - Kolchey Eilat

- Treating, delivering (60 Km.), storing & pumping the city of Eilat wastewater for irrigation in the Negev desert
- 25 units 4-10" 720, 730 & 73Q, 10 units 4-8" 920 & 130 units 3x3-350
- 200 K\$
- AGAT Engineering, Ardom Association & BERMAD Israel



Palestinian Authority - Jericho

- Conversion from open canals flood irrigation to pressurized drip irrigation
- 250 units 927-DD installed on hydrants
- BERMAD Part - 250 K\$
- Italian finance, USA supervision
- Anera, 2003



Japan - Shizoka Prefecture

- Tee trees irrigation systems
- 2000 units 2" 220 valves + 500 units 2" 900-D
- Estimated total project - 500 K\$, government finance
- E.S. Water Net



Philippines - Mindanao Irrigation

- Banana plantation for Dole & Delmonte companies
- 120 units 4 - 6" 420 & 740
- Netafim



USA - Strawberry Farms, Salinas, California

- Strawberry farm, buried irrigation application
- 160 units 3"L 120-55 + 50 units 2" 220-55
- BERMAD USA



Argentina - Jujuy

- Water carrier for irrigation
- 12 units 14", 18" & 20" model 753-67-49
- Tecnoflow S.A.



USA - Nut Tree Farming

- Almond trees, Buried irrigation application
- More than 5,000 units 2" 220 Through the years 1995 to 2005
- BERMAD USA



Israel - Hof Karmel

- Water desalination for Irrigation through a reservoir with pump station
- 10 units 6-12" 750/720/730 + 50 un. 4-8" AMV's + 300 2" AMV's, BERMAD Part -More than 250 K\$
- BERMAD & Netafim



USA - Nut Tree Farming

- Almond Trees, buried Irrigation application
- 260 units 3"L 120 valves, first phase of a farm in Bakersfield CA
- BERMAD USA



BERMAD Irrigation

User Guide



Main Network

- Reservoirs
- Pumping Stations
- Pressure Reducing
- Pressure Relief
- Pressure Relief/Sustaining

Irrigation Control Head

- On/Off Control
- Pressure Reducing
- Pressure Relief
- Flow Control
- Pressure Sustaining
- Filter Stations

Infield Head-Works

- On/Off Control
- Pressure Reducing, Standard
- Pressure Reducing, Drip-Tape
- Pressure Reducing & Sustaining
- Pressure Sustaining
- Flow Control
- Flow Control & Pressure Reducing

Infield System

- Pressure Reducing
- Anti-Drain
- Flush-'n-Stop

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- Pictures and drawings are for presentation only
- Bermad reserves the right to make any product changes without prior notice
- For further details please see our Comprehensive Irrigation Catalog
- Special technical documentation must be requested separately

BERMAD Model Selection Guide

Over the years BERMAD has expanded its manufacturing together with its R&D capabilities to meet each and every market need and customer desire, developing and marketing no less than nine different product lines. Today BERMAD customers can find a solution for every problem or application among the endless variety of patterns, diameters, pressure ratings, construction materials, and application options that BERMAD introduces in to the market. In fact, the only problem one might have is in selecting the very best option for each specific need from technical abilities, to reliability and service, environmental suitability, and cost efficiency.

By focusing on the IR-100, IR-400, IR-900 & WW-700 Series this Catalog represents BERMAD's efforts to make the selection of optimal solutions clearer and simpler for our customers.

One of the most frequently asked questions about irrigation valves is when to use each valve series and how to make the correct selection. Here are some helpful hints.

400 Series – Consider using when the ultimate in valve regulation is required and when:

- Applying metal valves in main line control where long term reliability is essential
- Low flow stable regulation at high differential pressure is required
- Systems pressure is higher and the valve may be subject to water hammer conditions
- Maintenance must be quick and simple
- Required valve diameter exceeds 10"; DN250

100 Series – Consider using when high flow & low pressure loss is required and when:

- Reinforced plastic valves are recommended for:
 - High chemical and cavitation resistance
 - Light weight valves which are frequently moved in crop rotation
 - Ease of installation of large projects for labor in the field
- Extreme regulating applications are expected such as low pressure drip-tape applications
- Supply pressures are limited, energy saving is a must and high flows are required
- Maintenance simplicity is desired
- Flexibility of end connection is an advantage in the installation of the valve
- Valves are exposed to pipeline bending and pressure stresses

900 Series – Consider using when metering and flow rate reading is required and when:

- An "All-in-One" water meter and control valve is an advantage, saving installation space, cost and maintenance
- Pressure and/or flow control regulation should be combined with accurate flow readout and transmission
- Straightening distances represent a problem
- Transfer systems simultaneously measure and control bulk water
- Batching and/or sequential non-computerized control is required

700 Series – Consider using when high performance, double chamber, industrial valve is required and when:

- Required pressure rating exceeds 16 bar; 230 psi
- Active check valves and surge anticipating valves for pumping stations are required
- System design requires down-hill serial pressure reduction or preliminary reduction for high ΔP
- Extreme regulating applications are required
- Reliable function under near-zero line pressure is needed
- Exotic metals and Elastomers are defined for aggressive water applications

Please refer to the tables on the next page, to help you determine the most suitable valve series for your specific needs. Complete technical details can be found in the Engineering section.

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Valves Flow Data Table

$$\Delta P \text{ bar} = [Q (\text{m}^3/\text{h}) / K_v]^2; \Delta P \text{ psi} = [Q (\text{gpm}) / C_v]^2$$

Valve Size		Recommended Flow Range V= 1.5-5 m/s; 5-17 f/s		Momentary Peak Relief Flow	Valve Flow Coefficient							
					400		100		900		700	
mm	inch	m ³ /h	gpm		Kv	Cv	Kv	Cv	Kv	Cv	Kv	Cv
40	1½	6-21	28-94	WW-700 Series V=15 m/s; 50 f/s	N.A.		N.A.		41	47	45	49
50	2	11-36	49-166		57	66	100	115	46	53	50	58
65	2½	17-57	76-260		78	90	100	115	51	59	55	64
80R	3R	17-57	76-260	IR-100 Series V=12 m/s; 40 f/s	N.A.		N.A.		50	58	N.A.	
80	3	25-82	110-375		136	157	100	115	115	133	115	133
80L	3L	44-146	196-665		N.A.		200	230	N.A.		N.A.	
100	4	44-146	196-665	IR-400 Series V=10 m/s; 33 f/s	204	236	200	230	147	170	200	230
150	6	98-328	440-1,498		458	529	400	460	430	497	460	530
200	8	175-584	783-2,663		781	902	N.A.		550	636	815	940
250	10	274-912	1,224-4,160		829	957	N.A.		550	636	1250	1440
300	12	394-1,313	1,762-5,990		1932	2231	N.A.		N.A.		1850	2140
350	14	394-1,313	1,762-5,990		1932	2231	N.A.		N.A.		1990	2300
400	16	700-2,335	3,130-10,650		1932	2231	N.A.		N.A.		3310	3820
450	18	700-2,335	3,130-10,650		N.A.		N.A.		N.A.		3430	3960
500	20	700-2,335	3,130-10,650		N.A.		N.A.		N.A.		3550	4100
600	24	1,575-2,250	7,050-23,970		N.A.		N.A.		N.A.		7350	8490
700	30	1,575-2,250	7,050-23,970	N.A.		N.A.		N.A.		7500	8670	
800	32	1,575-2,250	7,050-23,970	N.A.		N.A.		N.A.		7500	8670	

Allowable minimum and maximum flow rates depend on numerous system details such as:
Upstream pressures, set pressures, control circuit, system layout and influences of other system components.

As a "Thumb-Rule" for valve sizing please note:

- Recommended flow velocity for On/Off Valves is 1.5 m/s; 5 f/s
- Recommended flow velocity for Regulating Valves is 3 m/s; 11 f/s
- Valve head loss can be calculated according to the ΔP equation at the top of the Table.

Complete Technical details can be found in the Engineering section.

Valves Series Selection Table

Selection Parameter	IR-400 Series	IR-100 Series	IR-900 Series	WW-700 Series
Size Range	¾"-16"; DN20-400	2-6"; DN50-150	1½"-10"; DN40-250	1½"-32"; DN40-800
Valve Body Optional Patterns*	G; A	Y; A	G; A; H	Y; G; A
Construction Materials	Coated Iron or Ductile Iron	Glass-Filled Nylon	Coated Iron or Ductile Iron	Coated Ductile Iron
Pressure Ratings	16 bar; 232 psi	10 bar; 145 psi	16 bar; 232 psi	PN16: 16 bar; #150: 250 psi PN25: 25 bar; #300: 400 psi
Flow Metering Abilities	No	No	Yes	No
Double Chamber Actuator	No	No	No	Yes
Maintenance Required Skill	Basic	Basic	High	Medium

* G = Globe, A = Angle 90°, H= Hydrant (Angle 120°) Y= Oblique Globe

Note:

Marks are for comparison purpose.

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Valve Control Features:

After selecting the proper valve series, one can choose from over 200 valve models, the desired model according to valve location in the project and its required application as defined by its control features.

1. Main Feature/s – Selection of the suitable model requires proper definition of the valve main control feature or features:

- Pressure Reducing
- Pressure Sustaining
- Flow Control
- Solenoid Control
- Combination of the above, etc.

These features and others, enable the control valve to meet and answer system needs at a specific location.

2. Additional Feature/s – Proper definition of additional control features enables utilization of the control valve's potential to the fullest, in the following ways:

- Add-on of automatic functions that support and complete the valve main feature:
 - Downstream over-pressure guard
 - Closing-surge prevention
 - Check feature
 - Hydraulic override, etc.
- Determining valve status in the project control system, according to needs and control type, as well as environmental calculations and expected skill level of maintenance personnel.
 - Manual/Hydraulic/Electric - Opening/Closing control
 - Valve's desired normal position
 - Float type definition for level control valves, etc.

2.1 Valve Remote Control Features

N.O. Hydraulic Control:..... 50
 N.C. Hydraulic Control: 54
 Electric Control: 55

For Solenoid Control Confirm:

- Desired voltage and valve's normal position
- Controller abilities & requirements
- Lightning probability

Calculate wire size in accordance with:

- System pressure conditions
- Solenoid's power consumption, quantity & distance

Remote Control Options Comparison Table

Feature	Parameter	Simplicity	Fail-Safe	Plots with Slope	Remote Valves	Multiple Valves	Valve Response
50		++++	Open	+	++	++	Delayed
54		+++	Close	+++	++++	++++	Immediate
55		+++	Close	++++	++++	++++	Immediate

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Valve Control Circuit:

After defining the valve control features, the applications designer must select the suitable control circuit type (2-Way, 3-Way, 2/3-Way servo) for the application, considering network hydraulic and topographic conditions, water quality, required accuracy and sensitivity levels, etc.

Consider the information below as a guide when selecting the control circuit type:

■ 2-Way Control

Use when very accurate control is required in clean filtered water supply or dirty water with sediments. Works well in dynamic or static flow condition. Note that applying a 2-way control circuit has a small additional head loss across the valve in low and medium flow-rates ("V" below 2 m/s).

■ 3-Way Control (mark = X)

Use in applications where the water qualities can either be clean or dirty which includes some organic matter. 3-way control will enable the valve to fully open if required during high flow irrigation shifts; when the valve is required to fully open with minimal head loss.

■ Servo 3/2-Way Control (mark = b)

Use in applications where the water qualities can either be clean or dirty with sediments or organic matter.

The Servo 3/2-way pilot should be considered where extreme accuracy and regulation ability is required together with the possibility of dirty water. Especially recommended for pressure reduction of low pressure Drip-Tape (non compensated) irrigation systems.

Control Circuit Comparison:

2-Way Control Circuit **Default**

- Online accurate, quick respond regulation
- Very low set point
- Very high accuracy

3-Way Control Circuit **X**

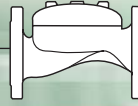
- Fully opens at low supply pressure
- Easy conversion from/to 2/3-way

2/3-Way Control Circuit **b**

- Very low set point
- Very high accuracy
- Dynamic integrated needle valve
- Upstream Setting pressure limit – 4 bar; 60 psi

Control Circuit Options Comparison Table

Circuit \ Parameter	Sensitivity	Accuracy	Stability	Minimum Setting	Clogging Risk		External Bleed
					Sediments	Organic Matter	
2-Way	++++	+++	+++	Very Low	Low	Medium	No
3-Way	++	++	++++	Low	Fair	Low	Yes
2/3-Way	++++	++++	++++	0.5bar; 7psi	Low	Low	No



IR-400 Basic Valve

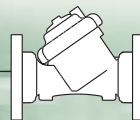
The basic Model IR-400 diaphragm actuated hydraulically operated valve is at the leading edge of control valve design. It combines simple and reliable construction with superior performance, while at the same time being virtually free of the typical limitations associated with other single chambered valves. These automatic water control valves are designed for vertical or horizontal installation and are available in diameter sizes of 2-16"; DN50- DN400, in a wide range of materials and end connections.

The design of the IR-400 valve body includes a full bore seat with unobstructed flow path, free of any in-line ribs, supporting cage, or shafts.

The unique hydro-dynamic globe design provides high flow capabilities with minimum head loss. The cover is removable via four (4) fastening bolts (up to 10") for quick in-line inspection and service. The internal design of the IR-400 valve is based on innovative technology using advanced rubber-based materials to achieve a solid, one piece elastomeric assembly including a flexible fabric reinforced diaphragm, vulcanized with a rugged radial seal disk. The diaphragm is carefully balanced and peripherally supported to avoid distortion and to protect the elastomer, resulting in long-life and controlled actuation even under harsh conditions. One diaphragm and spring fully meet the valve's operating pressure range requirements. The diaphragm assembly can be easily removed from the valve body with no need for disassembling the valve from the line.

The Model IR-400 Basic Valve uses valve differential pressure to power the diaphragm assembly open or closed. The lower side of the diaphragm, which serves to cushion the closing of the valve, is exposed to downstream pressure through a dynamic peripheral passageway that its width responds to differential pressure and flow along the downstream side of the valve. The pressure in the 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.





IR-100 hYflow Basic Valve

The BERMAD basic Model IR-100 hYflow diaphragm actuated, hydraulically operated valve is at the leading edge of control valve design. It combines simple and reliable construction with superior performance, while at the same time being virtually free of the typical limitations associated with standard control valves.

BERMAD's automatic water control valves are designed for vertical or horizontal installation and are available in sizes of 2", 2 1/2", 3", 4" & 6"; DN: 50, 65, 80, 100 & 150.

The Model IR-100 hYflow, made from industrial durable glass-filled nylon, is engineered to meet rough service conditions with high chemical and cavitation resistance.

The hYflow 'Y' valve body design includes a full bore seat with unobstructed flow path, free of any in-line ribs, supporting cage, or shafts.

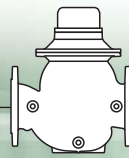
Its unitized Flexible Super Travel (FST) diaphragm and guided plug provide a significantly 'look through' passage from end to end resulting in ultra-high flow capacity with minimal pressure loss. The combination of a long travel guided valve plug, peripherally supported diaphragm, and replaceable valve seal provides:

- No chattering or slamming closed
- Accurate and stable regulation with smooth motion
- Low operating pressure requirements
- No diaphragm erosion and distortion
- Diaphragm and spring fully meet the valve's operating pressure range requirements.

Designed for service under a wide range of pressure and flow conditions, from dripping to maximum flow, the IR-100 hYflow excels at being a user-friendly control valve:

- Simple design with few parts guarantees easy in-line inspection and service.
- Adaptable on-site to a wide range of end connection types and sizes.
- Articulated flange connections isolate the valve from pipeline bending and pressure stresses.





IR-900-M Basic Valve

Hydrometer with Magnetic Drive

The BERMAD Model IR-900-M is a unique product integrating both a vertical turbine Woltman-type water meter and a diaphragm actuated hydraulic control valve. The vertical turbine impeller drive is magnetically coupled to a vacuum-sealed meter register in the control head. Both the magnetic drive control head and its register(s) are hermetically sealed and are not affected by dirty water nor environmental humidity.

The highly sensitive magnetic drive provides superior accuracy that exceeds all water meter standards. The available Reed Switch and Opto-Electric 4-20 mA transmitter options provide greater flexibility in electrical pulse generation.

Serving as Flow Meter and Main Valve, the BERMAD Model IR-900-M controls irrigation together with the irrigation controller.

The IR-900-M provides the full spectrum of metering functions – from simple visual readout, to pulse output for computerized data capture and control – while simultaneously allowing for numerous control valve features such as pressure, level and flow control.

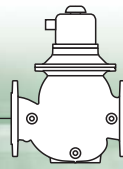
Ranging in size from 1½"; DN40 through 10"; DN250, the 900-M Series is specifically designed for metering and control applications in agricultural and landscape irrigation as well as in municipal & industrial water supply systems.

The flow metering unit is vertical to the pipeline and includes an impeller with integrated inlet and outlet flow straighteners. This internal design eliminates the need for straightening distances, enables vertical or horizontal installation, and ensures accuracy even when the valve is partially open during pressure or flow control tasks. The impeller assembly shaft serves as the closure assembly guide, while also centralizing and tightening all internal parts both in their position and to one another.

The basic Model IR-900-M combines simple and reliable construction with superior performance, while at the same time being virtually free of the typical limitations associated with other single chambered valves. The relatively high impeller housing raises the location of the vulcanized seal seat above the valve body. This results in remarkable cavitation resistance and a smooth mushroom-shaped flow where the valve body is distanced from the flow.

The closure assembly, combining a rugged radial disk harnessed to a flexible fiber reinforced diaphragm, slides on the guide along the full valve travel. The diaphragm is carefully balanced and peripherally supported to avoid distortion, resulting in long-life and controlled actuation even under harsh conditions. One diaphragm and spring fully meets the valve's operating pressure range requirements. The cover is removable via fastening bolts for quick in-line inspection and service. All the internal assemblies can be easily removed from the valve body with no need for disassembling the valve from the line.





IR-900-D Basic Valve

Automatic Metering Valve (AMV)

The BERMAD Model IR-900-D is a unique product integrating both a vertical turbine Woltman-type water meter and a pilot operated, diaphragm actuated control valve, with a built-in auxiliary shut-off pilot for batch applications. When this unique assembly delivers a preset quantity of water, its control head mechanism mechanically shifts the shut-off pilot. This automatically and smoothly closes the control valve, stopping the flow of water.

The IR-900-D provides the full spectrum of metering functions - from simple visual readout, through non-computerized dose control, to pulse output for computerized data capture and control - while simultaneously allowing for numerous control valve features such as pressure, level and flow control.

Ranging in size from 1½"; DN40 through 10"; DN250, the 900-D Series is specifically designed for metering and control applications in agricultural and landscape irrigation as well as municipal and industrial water supply systems.

The flow metering unit is vertical to the pipeline and includes an impeller with integrated inlet and outlet flow straighteners. This internal design eliminates the need for straightening distances, enables vertical or horizontal installation, and ensures accuracy even when the valve is partially open during pressure or flow control tasks.

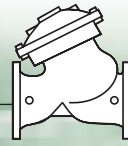
The impeller assembly shaft serves as the closure assembly guide, and for centralizing and tightening all internal parts both in their position and to one another.

The basic Model IR-900-D combines simple and reliable construction with superior performance, while at the same time being virtually free of the typical limitations associated with other single chambered valves. The relatively high impeller housing raises the location of the vulcanized seal seat above the valve body. This results in remarkable cavitation resistance and a smooth mushroom-shaped flow where the valve body is at maximum distance from the flow.

The closure assembly, combining a rugged radial disk harnessed to a flexible fiber reinforced diaphragm, slides on the guide along the full valve travel. The diaphragm is carefully balanced and peripherally supported to avoid distortion, resulting in long-life and controlled actuation even under harsh conditions. One diaphragm and spring fully meets the valve's operating pressure range requirements.

The cover is removable via fastening bolts for quick in-line inspection and service. All the internal assemblies can be easily removed from the valve body with no need for disassembling the valve from the line.





WW-700 Basic Valve

The basic Model WW-700/705 diaphragm actuated and the WW-800/805 piston-actuated 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 WW-700/800). The shaft sub assembly, in both single and double chambered versions is center guided, providing an unobstructed seat area.

The Model WW-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 WW-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 WW-700 and WW-800 Series applications.



Irrigation for Agriculture

Main Network

Irrigation system **Main Network** design and operation starts with careful examination of the available water sources and the physical conditions of the project regarding expected flow, pressure, and quality ranges. Based on these parameters, the project engineer determines the type, size and location of major system components including pump stations, reservoirs, supply lines, pressure control devices, air release, filtration, and so on.

These components are then integrated into the **Main Network** to achieve continuous, reliable, efficient, and cost-effective irrigation.



BERMAD Irrigation

Main Network



Reservoir



Level Control System



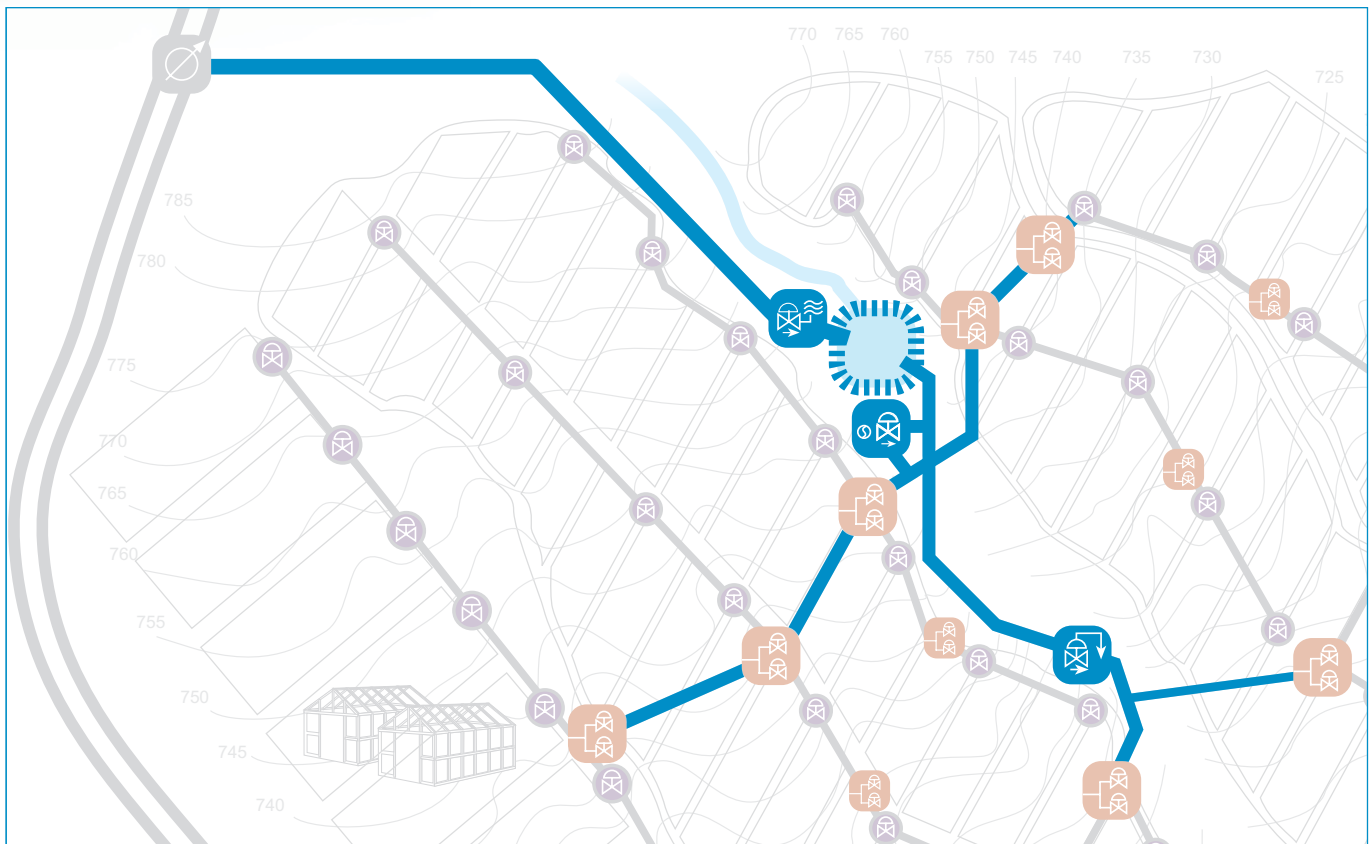
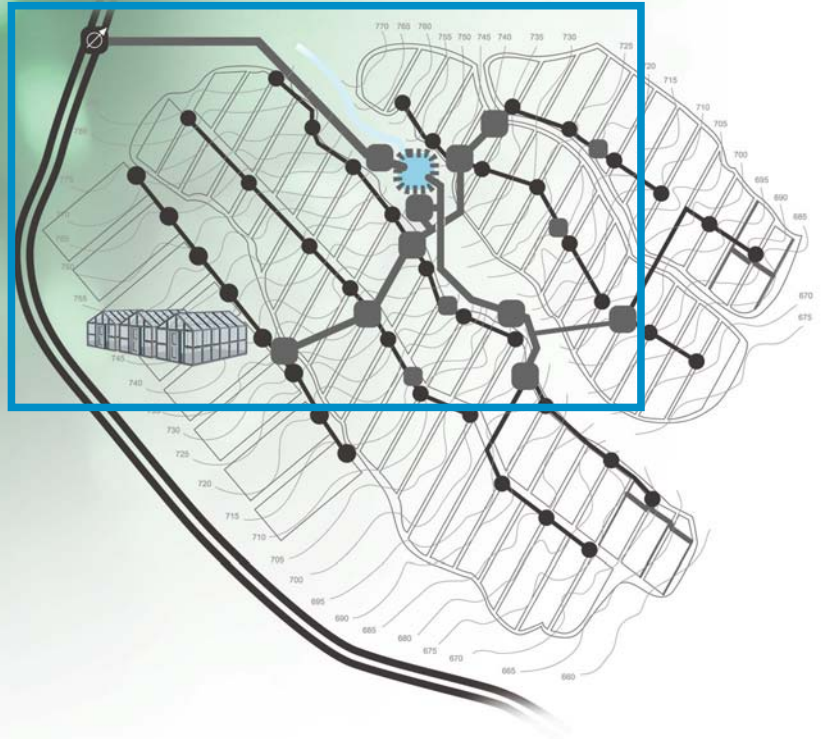
Pumping Station



Pressure Reducing System



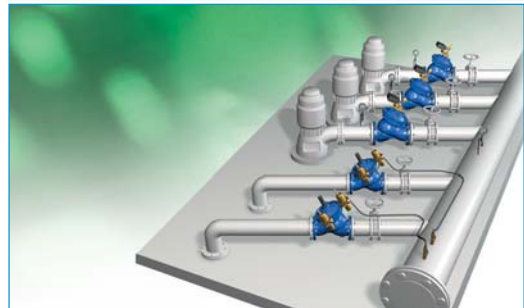
Main Line



Reservoirs



Pumping Stations



Pressure Reducing



Pressure Relief



Pressure Relief/Sustaining



Level Control Valves

Level Control Valves combine the advantages of excellent hydraulic control valves with the simplicity of altitude pilots or mechanical floats. External installation of the main valve eliminates 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.



Applications Guide

- Full Range of Low Level Reservoirs
- Unavailable Power Supply Locations
- Very Low Supply Pressure Systems
- Energy Cost-Critical Systems
- Fertilizer Mixing Tanks (IR-450-60)
- High Level Reservoirs and Water Towers (IR-450-80)
- Level Sustaining at Reservoir Outlet (IR-453)
- Limited Supply Pressure Systems (IR-453)
- Systems Irrigated Directly from Fill-Up Line (IR-453 & IR-457)
- Backup for Reservoir Supply Valves (IR-453 & IR-457)
- Limited Flow Capacity Systems (IR-457)
- Reservoirs Subject to High Inlet Pressure (IR-457)
- Pressure Breaking Reservoirs in Gravity Fed Lines (IR-457)



Level Control BERMAD Valve with Modulating Horizontal Float

IR-450-60-R

The BERMAD Level Control Valve with Modulating Horizontal Float hydraulically controls reservoir filling, to maintain constant water level for “Always Full” reservoir applications such as: large surface area reservoirs, low volume reservoirs, and fertilizer mixing tanks.



Level Control BERMAD Valve with Bi-Level Vertical Float

IR-450-66-Z

WW-750-66-B

The BERMAD Level Control Valve with Bi-Level Vertical Float is hydraulically controlled to fully open at the preset reservoir low level and to shut at preset high level. It provides On/Off service with long life operation and is suitable for controlling the full range of low level reservoirs even when power supply is unavailable.



Level Control BERMAD Valve with Altitude Pilot

IR-450-80-XZ

WW-750-80-X

The BERMAD Level Control Valve with Altitude Pilot hydraulically shuts at the preset 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. It does not require float installation, and it provides On/Off service with long life operation. The valve is suitable for controlling reservoir level while filling, or for sustaining water level at reservoir outlet for the full range of high level reservoirs and water towers.



Level Control & Pressure Sustaining BERMAD Valve with Bi-Level Vertical Float

IR-453-66

Level & Flow Control BERMAD Valve with Bi-Level Vertical Float

IR-457-66-U

IR-453-66

IR-457-66-U

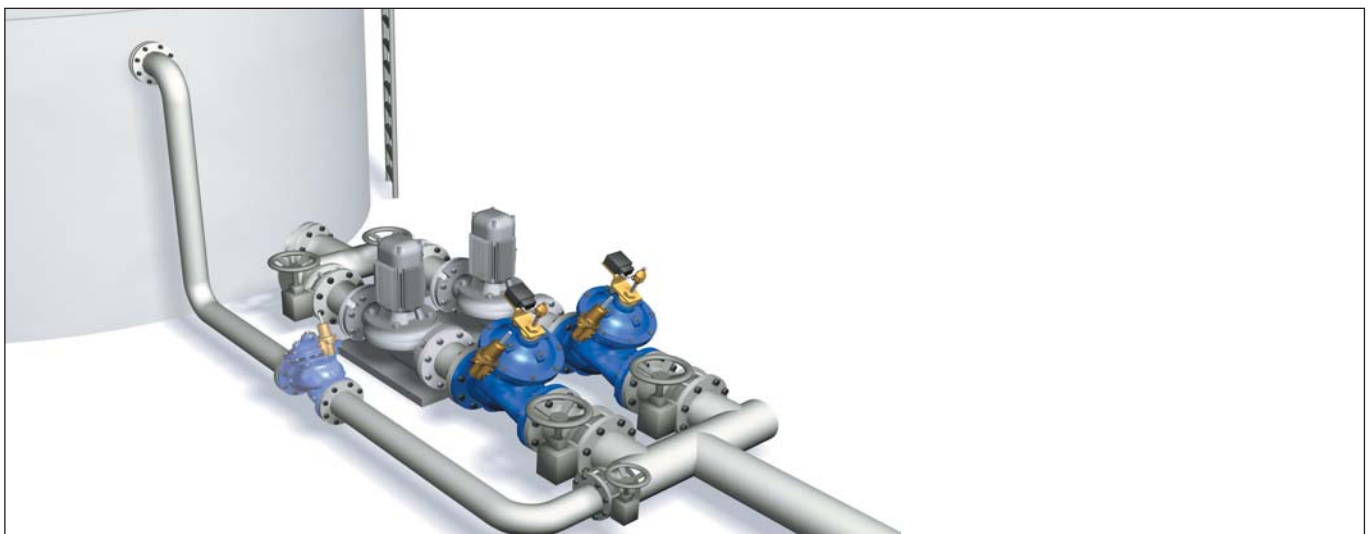
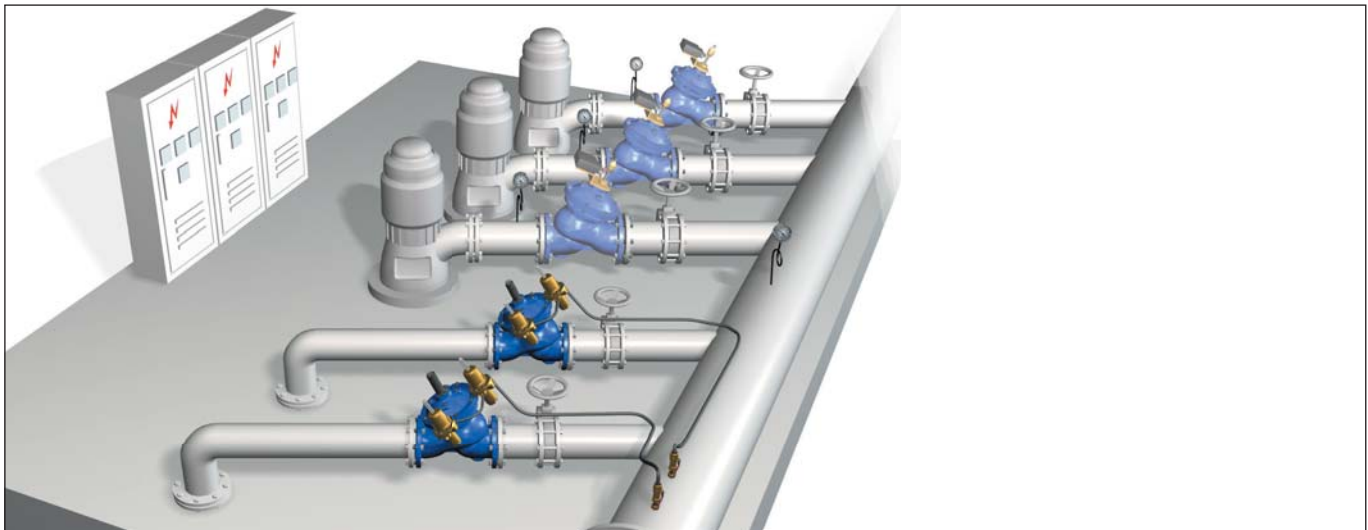
The BERMAD Models IR-453-66 and IR-457-66-U, hydraulically control reservoir filling. They open at the preset reservoir low level, and shut at preset high level. During filling, they sustain system minimum upstream pressure (IR-453-66), or limit fill-up flow to a maximum preset value (IR-457-66-U). The valves are suitable for controlling the full range of low level reservoirs, especially in systems irrigated directly from fill-up line, systems with limited supply pressure or flow capacity, and pressure braking reservoirs in gravity fed lines or other reservoirs subject to high inlet pressure.

The BERMAD Models IR-453-66 and IR-457-66-U can also serve as backup for standard reservoir valves.

Pumping Station Valves

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

Abrupt pump stoppage due to power failure, or to control or mechanical errors, 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 precaution. **Surge Anticipating Valves** react to the pressure drop, receiving the returning column while already open, thereby eliminating the surge.



Applications Guide

Pump Control Valves

- Isolates system from the effects of pump start-ups 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 (WW-743)
- Controlled pipeline fill-up (WW-743)

Surge Anticipating Valves

- Eliminates surge in all pumping systems:
 - Booster & deep well, single & variable speed
- Eliminates surge in all distribution networks:
 - Irrigation, municipal, sewage, HVAC
 - Difficult to maintain, remote locations, older systems



Booster Pump Control BERMAD Quick Active Check Valve

WW-740Q

The BERMAD 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 start-up and stopping, to prevent pipeline surges.



Booster Pump Control & Pressure Sustaining BERMAD Active Check Valve

WW-743

The BERMAD Booster Pump Control & Pressure Sustaining Valve adds a pressure sustaining feature to the Booster Pump Control Valve. While open, it sustains minimum discharge pressure to protect the pump from overload and cavitation, and to control pipeline fill-up.



Surge Anticipating BERMAD Control Valve

WW-735-M

The BERMAD Surge Anticipating Valve is an off-line control valve. Sensing line pressure, it 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.



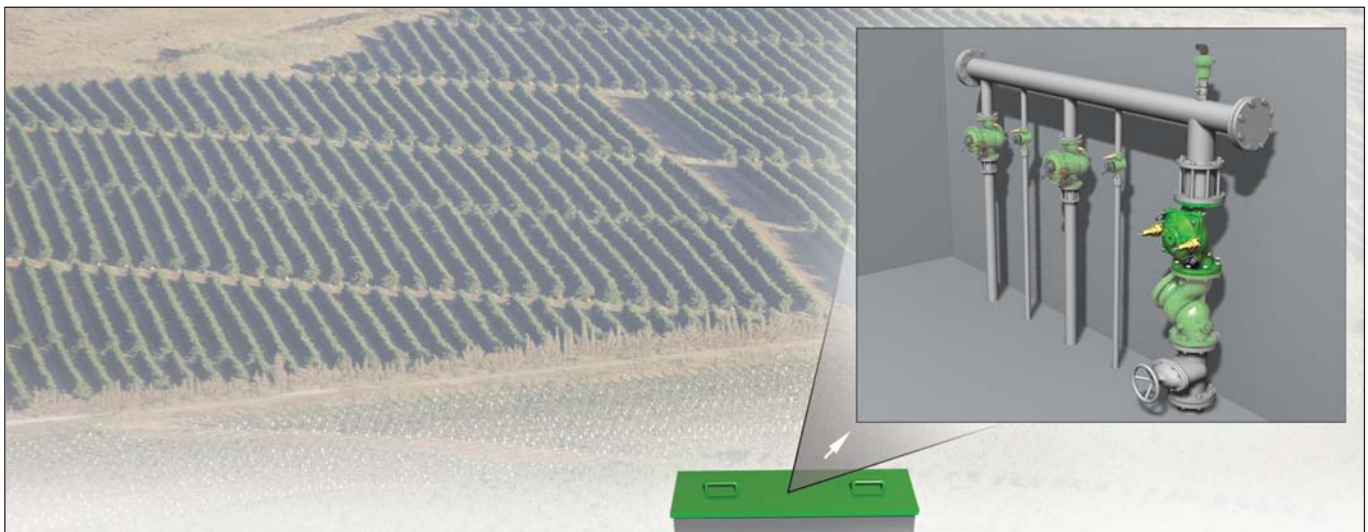
Surge Anticipating BERMAD Control Valve with Solenoid Control

WW-735-55-M

The BERMAD Model WW-735-55-M adds an electric override feature to the standard Surge Anticipating Valve, providing immediate opening in direct response to any power failure, even prior to the pressure drop associated with abrupt pump stoppage. The Model WW-735-55-M is recommended for sensitive systems as it includes redundant actuation (Hydraulic & Electric), and for "Short-Line" systems.

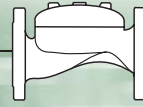
Pressure Reducing Valves

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. These are the most commonly used control valves.



Applications Guide

- Pressure Reducing Stations
- Flow and Leakage Reduction
- Pressure Zoning
- Downhill Supply Lines
- Source & “On Duty” Valves Management (IR-420-55; WW-720-55)
- Pressure Zone Isolation (IR-420-55; WW-720-55)
- Systems Subject to Sudden Demand Changes (IR-420-48)
- Line Exposed Pressure Peaks (IR-420-48)
- Prevention of Supply Line Emptying (IR-423; WW-723)
- Higher Pressure Zone Prioritizing (IR-423; WW-723)
- Line Fill-Up Control (IR-423; WW-723)
- Pump Overload & Cavitation Protection (IR-423; WW-723)
- Downhill Serial Pressure Reduction (WW-720-PD)
- High ΔP Systems (WW-720-PD)



**Pressure Reducing
BERMAD Valve**

IR-420

The BERMAD 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 Reducing
BERMAD Valve**

IR-420-XZ

This BERMAD Pressure Reducing Valve with a 3-Way control circuit reduces higher upstream pressure to lower constant downstream pressure regardless of fluctuating demand and opens fully upon line pressure drop.



**Pressure Reducing
BERMAD Valve
with Solenoid Control**

IR-420-55

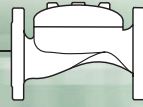
The BERMAD Pressure Reducing Valve with Solenoid Control adds an On/Off control feature to the standard Pressure Reducing valve. It opens and shuts in response to an electric signal.



**Pressure Reducing
BERMAD Valve
with Solenoid Control**

IR-420-55-X

The BERMAD Pressure Reducing Valve with Solenoid Control, adds an On/Off control feature to the standard 3-Way Pressure Reducing valve. It opens and shuts in response to an electric signal.



**Pressure Reducing
BERMAD Valve
with Downstream Over-Pressure Guard**

IR-420-48

The BERMAD Model IR-420-48 adds a Downstream Over-Pressure Guard feature to the standard pressure reducing valve. This enables an immediate closing response, minimizing deviation from set point caused by a sudden drop in demand or an upstream pressure peak.



**Pressure Reducing & Sustaining
BERMAD Valve**

IR-423

The BERMAD Pressure Reducing and Sustaining Valve adds a pressure sustaining feature to the standard pressure reducing valve, enabling it to perform two independent functions. When upstream pressure is high, it prevents downstream pressure from rising above maximum preset. Should upstream pressure drop, the valve throttles closed to sustain minimum preset upstream pressure, protecting supply systems.



**Pressure Reducing & Sustaining
BERMAD Valve**

IR-423-XZ

This BERMAD Pressure Reducing and Sustaining Valve with a 3-Way control circuit, performs three independent functions. When upstream pressure is high, it prevents downstream pressure from rising above maximum preset. Should upstream pressure drop, the valve throttles closed to sustain minimum preset upstream pressure - protecting supply systems. Should line pressure remain above the sustaining pilot setting but below the reducing pilot setting, the valve opens fully – reducing head lose.



Pressure Reducing BERMAD Valve

WW-720

The BERMAD 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 Reducing BERMAD Valve with Solenoid Control

WW-720-55

The BERMAD Pressure Reducing Valve with Solenoid Control adds an On/Off control feature to the standard Pressure Reducing valve. It opens and shuts in response to an electric signal.



Pressure Reducing & Sustaining BERMAD Valve

WW-723

The BERMAD Pressure Reducing and Sustaining Valve adds a pressure sustaining feature to the standard pressure reducing valve, enabling it to perform two independent functions. When upstream pressure is high, it prevents downstream pressure from rising above maximum preset. Should upstream pressure drop, the valve throttles closed to sustain minimum preset upstream pressure, protecting supply systems.



Proportional Pressure Reducing BERMAD Valve

IR-720-PD

The BERMAD Proportional Pressure Reducing Valve is a pilot-less, double chambered, hydraulic control valve that reduces higher upstream pressure to lower downstream pressure at a fixed ratio.

Pressure Relief Valves

Sudden changes in demand - switching of irrigation Shifts, closing of reservoir valves, air release valve action, completion of line fill-up, and so on - create a high pressure wave, which travels along the line. Pressure Relief Valves, when carefully designed, selected, sized and positioned, are the most secure simple and cost-effective way of dealing with such problems. They relieve excessive system pressure by opening fully in response to a pressure rise, responding immediately, accurately, and with high repeatability.



Applications Guide

- Pressure Reducing Stations
- System Burst Protection
- Momentary Pressure Peak Elimination
- System Failure Visual Indication
- Filter Burst Protection



Pressure Relief BERMAD Valve

IR-43Q

The BERMAD Quick Pressure Relief Valve is a single chambered, hydraulically operated, diaphragm actuated control valve that responds immediately, accurately, and with high repeatability, relieving excessive system pressure when this pressure rises above the pre-set value. The Model IR-43Q provides smooth drip tight closing.



Pressure Relief BERMAD Valve

WW-73Q

The BERMAD Model 73Q Quick Pressure Relief Valve is a double chambered control valve. This excels a diaphragm isolated from flow & protected, balanced seal disk to ensure higher flow rates at higher ΔP , and larger closing force with restrained drip tight closing.

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, and preventing line emptying, pump overload, etc.



Typical Applications

- Prevention of Downhill Supply Line Emptying
- Pressure Zone Prioritizing
- Line Fill-Up Control
- Pump Overload and Cavitation Protection
- Pump Minimum Flow Safeguarding
- Excessive Line Pressure Protection
- Systems with Various Pressure Regimes (IR-430-55)
- Backup for Reservoir Supply Valves (IR-430-55)
- Filter Emergency By-Pass (WW-736)



**Pressure Relief / Sustaining
BERMAD Valve**

IR-430

WW-730

The BERMAD 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 preset upstream (back) pressure regardless of fluctuating flow or varying downstream pressure. When installed as a relief or circulation valve, it relieves line pressure in excess of preset value.



**Pressure Sustaining
BERMAD Valve**

IR-430-XZ

This BERMAD Pressure Relief/Sustaining Valve with a 3-Way control circuit sustains minimum preset upstream (back) pressure regardless of fluctuating flow or varying downstream pressure. It opens fully upon line pressure rise above setting, saving system head loss & energy.



**Pressure Relief / Sustaining
BERMAD Valve
with Solenoid Control**

IR-430-55

WW-730-55

The BERMAD Pressure Sustaining Valve with Solenoid Control adds an On/Off control feature to the standard pressure sustaining valve. It opens and shuts in response to an electric signal, controlling systems with various pressure regimes or serving as backup for reservoir supply valves.



**Differential Pressure Sustaining
BERMAD Valve**

WW-736

The BERMAD Differential Pressure Sustaining Valve sustains minimum pre-set differential pressure between two points such as pump suction and discharge, filter inlet and outlet, heat exchanger or chiller distribution and collection lines, etc.