BERMAD Waterworks

Applications

Hydraulic / Electronic Pressure Reduction Valves For Pressure Management Applications

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Dynamic Pressure Control in the Operation of Water Supply Systems

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Water companies and authorities are committed to the uninterrupted supply of water at the required quantity, quality and pressure. In Israel, as in the rest of the Western world, water system planning is based on the assumption of growth in both population and demand, with the objective being the system's ability to cope with peak demand days and hours, for the duration of the system's expected life span. In many instances, the water supply system is adjusted to the daily peak demand hours. Pressure reducers, for example, are calibrated to maintain a consistent pressure at the pressure reduction point, such that it will be sufficient to cope with demand during peak hours. In these cases, there are many periods of operation during which the system is working in a state of "over-production", with excess pressure in the system.

Dynamic pressure control that adjusts to changing conditions throughout the day and from season to season, is an efficient tool that contributes greatly to several aspects of the system's operation:

- Reduction of water leakage, resulting in –
  - Efficient use of existing water resources
  - Delaying need to invest in development of new water sources
- Reduction in number of pipe bursts (up to 50%), resulting in –
  - Reduced water system maintenance costs
  - Extended life span of system pipes and accessories
  - Delaying need to invest in system renovations
- Increased reliability of water supply, together with higher customer satisfaction
- Optimal match between infrastructure size and water supply demand, with reduced investment in infrastructure
- Reduction in energy consumption for operation of water supply installations

The aim of dynamic water pressure control is to achieve uninterrupted pressure regulation such that excess pressure will not be created at critical junctures in the system, while minimum pressure is maintained constant. Pressure is adjusted in accordance with supply, based on pre-set times or other indicators remotely measured at the system's critical junctures. The primary means of pressure regulation are pressure reducing control valves installed at critical points at the entrance to supply zones.

Figure 1: Pressure management system of measurement zone in municipal system in Greece.

The immediate contribution of pressure control is the resulting reduction in leakage and reduced number of burst pipes. Experience indicates that a large proportion of leakage originates at small leakage points, in the small-diameter service lines, at the line connections, and at adapters. It is very difficult, and not economical, to locate and repair these numerous small leaks. Reduced pressure is therefore the most efficient and economical way of reducing leakage originating at these points. Furthermore, ongoing and regulated pressure control that avoids excess pressure and frequent changes in pressure significantly reduces the number of bursts in the system's lines. Studies conducted around the world indicate that it is possible to reduce both leakage and incidence of pipe bursts by 50%.

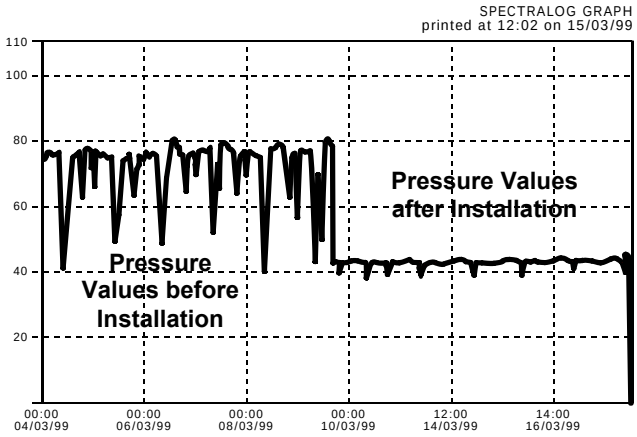


Figure 2: Pressure curve at critical juncture in water system, before and after installation of pressure control system

Project Khayelitsha, South Africa

As part of a comprehensive project in South Africa, a product developed by BERMAD was installed and used with great success. The BERMAD product was a modulated pressure reducing valve with controller, for use in a pressure regulating system and aimed at solving the problem of leakage in the municipal water supply lines. It proved to be an optimal system for minimizing leakage in water supply lines through management of the system's water pressure.

In June 2001 the Cape Town municipality embarked on a project to introduce a pressure management system into the Khayelitsha water supply lines. The main objective was to improve water supply services to this community by reducing excess pressure in the system. Khayelitsha is one of South Africa's largest townships. Located 20 kilometers from Cape Town, it covers an area of 24 square kilometers with a population of 450,000.

At an initial project cost of some $500 thousand, the resulting average annual savings are $2.7 million from reduced leakage and consumption. Reduced consumption is a result of system pressure management, generating approximately 12% savings in supplied water.

The project utilized BERMAD adjustable pressure reducing valves, model 720-4T, together with Technolog control mechanisms. Installed on the city's main supply lines and controlled by the Modulo-One control mechanism, the pressure reducing valves are successfully carrying out their objective of system pressure management.

Figure 3: Khayelitsha township pressure management system with BERMAD pressure reducing valves.

Project Results – Water Savings

Savings due to regular pressure reduction (fixed downstream pressure)

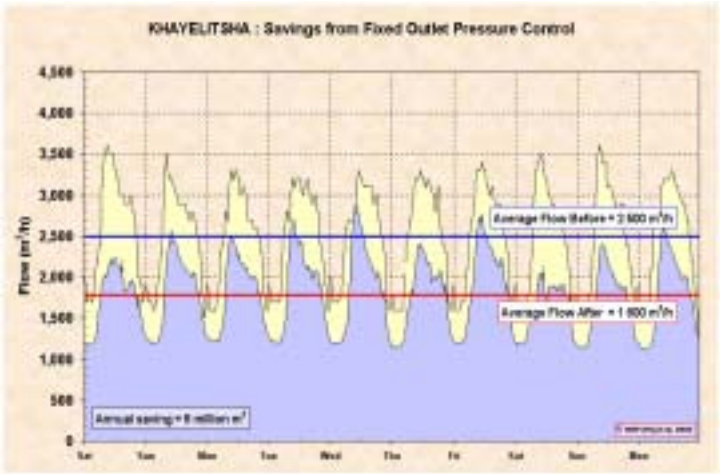


Figure 4: Saving from fixed outlet pressure control

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.

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.

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

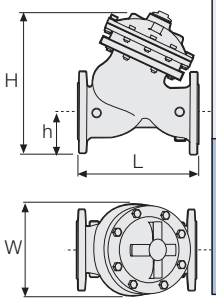
- Full powered opening & closing – **718-03-B**
- Downstream over pressure guard – **718-03-48**
- Relief override – **718-03-3Q**
- Check feature – **718-03-20**
- Flow-over-the-seat (fail-safe close) – **718-03-O**

See relevant BERMAD publications.

SI 700 Metric

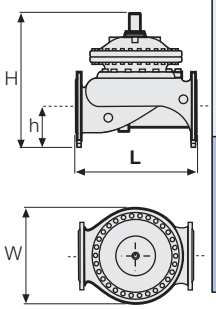
Flanged

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



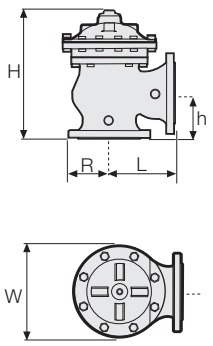
Length according to EN 558-1

	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

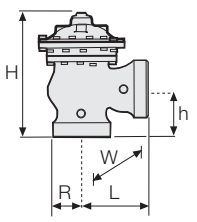
Angle Pattern



	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

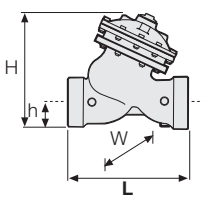
Threaded

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