



Value, Performance, Quality

Ultra ACV

AUTOMATIC WATER CONTROL VALVES



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Ultra Control Valves cc was formed in 2009 in order to present a Company in the market place who's efforts are mostly concentrated on Automatic Control Valves and with an emphasis on the new **Ultra ACV** Automatic Water Control Valve product. This valve has its origins in the USA (**Muesco Baker**) and has been copied by many companies worldwide because of its high level of technical advantages over competitive products. With a combined experience of over 50 years in the valve industry, the Personnel of Ultra are committed to offer superior service in both pre-sales (application advise and consulting) and after-sales (commissioning/trouble shooting). Although the concentration is on Control valves, a complete range of other valves are available – all aimed at providing long life and complete Pipeline solutions, including Waterhammer reduction techniques and products.

Introduction

Purchasing Automatic Control Valves is a critical balancing act. On the one hand you want a reliable product of unquestionable quality; on the other hand you want a product that is supported by a trusted after sales set-up. With the **Ultra ACV** valve, you can get both a quality product and unsurpassed product support from **Ultra Control Valves**. Our well-trained and experienced sales engineers offer specification assistance, analysing system conditions to recommend the right valve for your application. **Ultra Control Valves** does not sell valves, we sell control valve solutions. The after sales service supplied by **Ultra Control Valves** personnel has stood the test of time.

In order to keep pace with changing market requirements, the **Ultra ACV** valve is now made from cast steel, with a fusion-bonded epoxy coating. You can now get a tough valve body, offering not only a long life, but also minimal maintenance under the harsh conditions experienced in various industries in Southern Africa. For tougher applications we offer our all stainless steel valve, which is an affordable and acceptable option for aggressive water of high and low ph values.

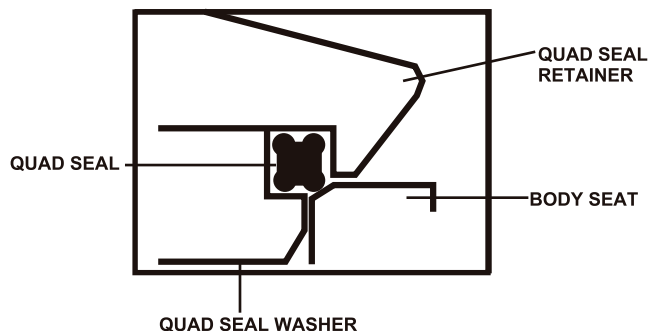
FBE coating

The role of a high quality coating on the valve body cannot be underestimated. The **Ultra ACV** valve is coated with a fusion bonded powder coating to a minimum thickness of 250 microns. RAL 5005 is one of the finest FBE coatings and is approved for drinking water by WRAS. The coating protects the valve from environmental attack externally, as well as rust and mineral build up (a major factor in control valve failure) internally. It prolongs the life of the valve and makes servicing very easy.

Efficient valve design

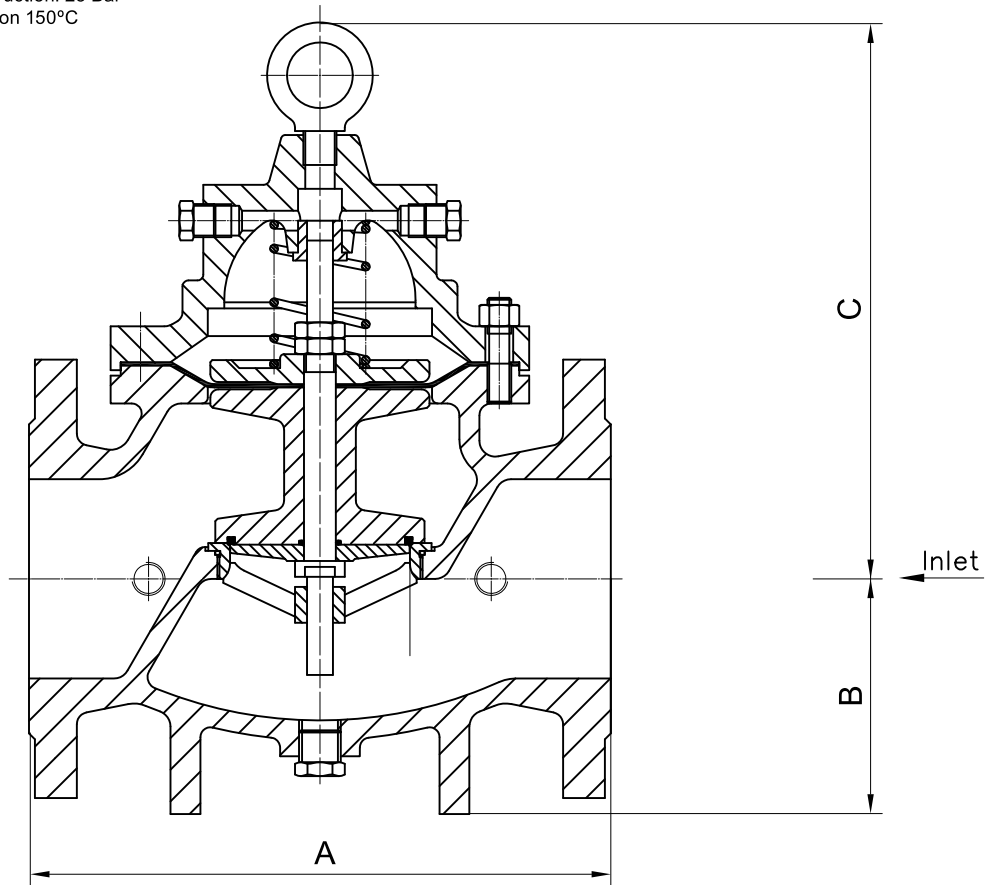
The **Ultra ACV** valve is a globe style, diaphragm actuated, hydraulic pilot operated control valve. The globe design has superior features, which make it the best for the regulation of fluids. The spindle assembly, which carries the diaphragm and seat, is the only moving part in the valve. This simple design ensures a reliable and trouble-free valve life. The spindle assembly is supported at both ends by bearings, which stabilises throttling and assists positive closure with a near frictionless operation. This design has proven to be superior to Y-Pattern single bearing designs which suffer from early bearing wear and subsequent faulty operation – including seizure of the Diaphragm Assembly.

The **Ultra ACV** valve furthermore incorporates a Dynamic Quad Seal as the main seal and which has proven to be superior to Flat Seals or O-rings.



The **Ultra ACV (Muesco Baker)** design is the only valve of its kind with a cavitation resistance which enables it to reduce pressure in a 4:1 ratio with the standard design whereas most competitors can only achieve a 3:1 ratio. Similar type Water Control valves are available from Ultra for up to 150bar working pressure

Standard Rating Steel Construction: 25 Bar
 Temperature: NBR 80°C / Viton 150°C



Dimension Data

Size	A	B	C	Mass kg
50	203	55	210	13
80	241	105	245	25
100	292	155	305	31
150	356	155	415	80
200	495	330	510	165
250	622	330	560	230
300	698	372	658	330
350	787	394	696	440
400	914	415	735	640
450	978	415	735	800
500	1075	400	620	870
600	1230	455	695	1240
700	1300	510	930	1720
800	1450	560	950	2200

Materials of Construction

Basic Valve components	Specifications
Cover	Cast steel
Bearing	Copper
Spring	Stainless steel
Stem nut	Stainless steel
Diaphragm washer	Cast steel
Stud	Steel
Stud nut	Steel
Diaphragm**	NBR
Body	Cast steel
Quad ring retainer	Cast steel
Quad ring seal**	NBR
Seat	Stainless steel
Seat gasket	NBR
Quad ring washer	Ductile iron
Stem	Stainless steel
Spacer (150-400mm)	Ductile iron
O ring**	NBR

** Suggested spares

Hydraulic Control Parts

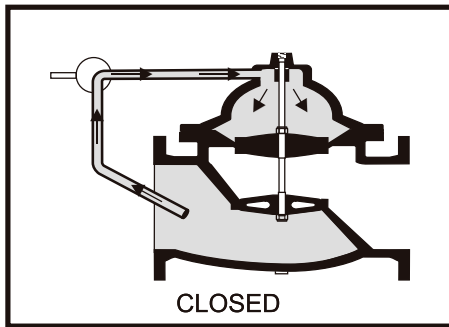
Bodies: Brass-ASTM B584
 Internals: Stainless steel
 Elastomers: NBR
 (Other materials available ie. Stainless Bodies)

Available in Standard Flange Drillings

BS 4504 T10, T16, T25
 BS 10 TD, TE, TF
 ANSI 150, 300

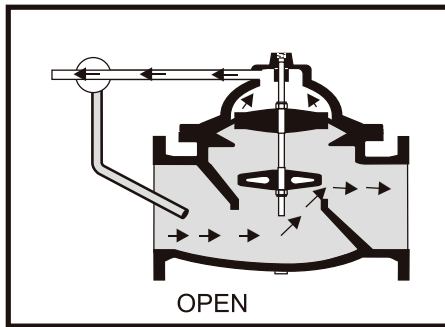
System of Operation

The Ultra ACV hydraulic control valve system is based on a robust, reliable, hydraulically operated, diaphragm actuated valve with, which various controls may be incorporated, either singly or in combination with each other, to provide any conceivable operation that may be required for regulating the flow of water.



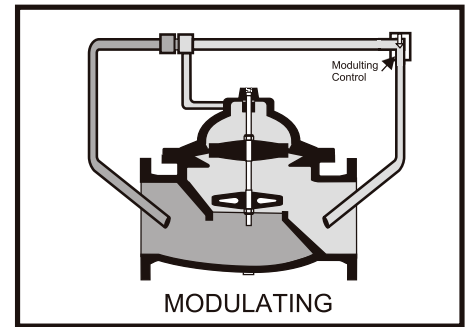
Valve Closed

The valve closes when pressure is directed into the valve cover chamber above the diaphragm. An independent operating supply may be used if its pressure is equal to, or greater than the pressure at the valve inlet.



Valve Open

The valve opens fully when there is no pressure in the cover chamber and at least 50 kPa line pressure at the valve inlet.



Valve Modulating

Modulating action can be obtained by installing a control system to the basic valve. Various controls are available to modulate and compensate for pressure, flow rate, or liquid level changes.

Functions

Up to 1500 combinations of pilot arrangements are available and these are affected by the use of the following basic functions:

Function 10	Float level control
Function 12	Differential relief control
Function 13	Solenoid control
Function 14	Rate-of-flow control
Function 15	Pressure reducing control (integrally sensed)
Function 15-1	Pressure reducing control (Remotely sensed)
Function 16	Pressure sustaining/relief control
Function 22	Accelerator control (With an integral orifice)
Function 22-1	Accelerator control
Function 27	Altitude level control

These functions may be supplemented by the use of the following accessories:

Function 50	Valve position indicators
Function 51	Limit switches
Function 60	Flow clean strainers
Function 60-1	'Y' pattern strainers

Some typical schematics are shown on pages 5, 6, 7

LEVEL CONTROL APPLICATIONS

The Ultra ACV valve can be used to control Water Level in Reservoirs and Tanks in a variety of different ways depending on many factors such as Pressure and Flow conditions and configurations of the installation. A logical way to classify the different methods to control level is by On-off or Modulation. Within both groups an almost unlimited combination of other functions can be added such as Pressure Sustaining, rate of Flow control, Solenoid override etc, which makes the Baker Control valve very versatile. In both groups the choice can be made to install the valve as a top-of-reservoir valve mounted inside (or outside) the reservoir, or as a bottom entry with the valve mounted on the bottom of the reservoir. Please note that a stilling well should be installed with the float pilot if water turbulence could affect the operation. The stilling well can be an appropriate diameter plastic pipe (normally 300mm).

Hydraulic Conditions

In order for Level control valves to operate effectively and provide long trouble-free life, flow and pressure conditions have to be investigated. Two pressure conditions can create problems i.e.

1.) HIGH PRESSURE

Dam (or reservoir) control valves have always been susceptible to two potential problems caused by high pressure conditions which can be overcome if one is aware of what the problems are.

CAVITATION

Most control valves can handle a pressure drop ratio of no more than 3:1. Because of its unique features the Ultra ACV control valve can handle a 4:1 pressure drop ratio. Even so in a Level control application if one assumes a back pressure of 1 bar from the head of the reservoir downstream of the valve, the valve can only effectively cope with 4bar upstream in order to provide a long life.

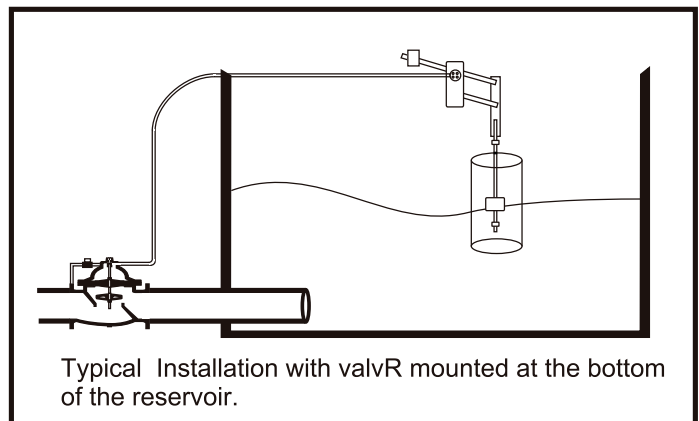
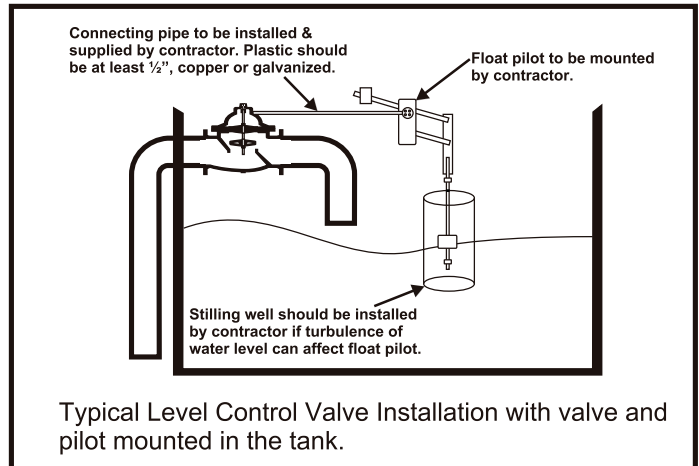
HIGH FLOW RATES

If a level control valve is allowed to go fully open and dynamic head is above 1.5bar, a flow rate far beyond the recommended can occur which can cause further damage. In both of the above situations the extent of the valve's life will be determined by the level of the upstream pressure. If the discharge into the dam is free with the valve installed at the end of the line, the problem is not as severe because cavitation will occur outside the valve, but one still has the high velocity problem.

Our recommendations for these installations are outlined below.

- Upstream Dynamic head between 5 and 10 bar**
 Install a Flow control function on the Ultra ACV Level Control Valve to limit flow rate to an acceptable level and install an orifice plate downstream of the valve to provide an artificial back pressure. The valve will still experience cavitation during the opening and closing cycles, but as long as the cycles are not too frequent and closing and opening speed is not too long, the above recommendations should ensure a reasonable valve life.
- Upstream Dynamic head over 10 bar**
 Install a Flow control pilot on the Ultra ACV Level Valve and install an additional Pressure Reducing valve upstream of the Level control valve. The Pressure Reducing valve can be either a pilot operated Ultra ACV valve or a Ultra Ratio Reducing valve which operates without a pilot and can handle pressure drops of up to 4:1.

The above are guidelines. For assistance with these concepts, please do not hesitate to contact Ultra sales staff.



2.) LOW PRESSURE

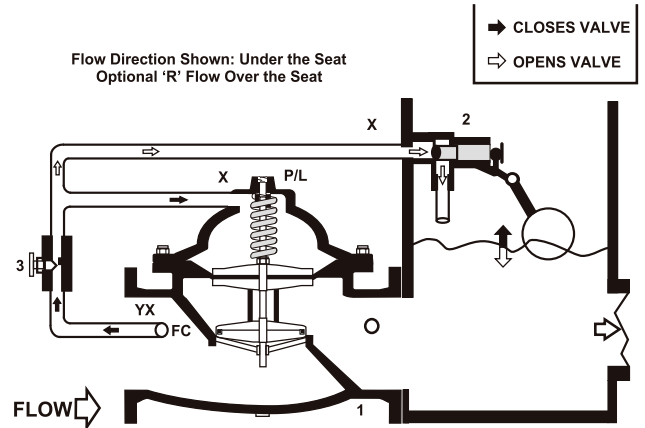
Flowing line pressure should be 50kPa or more to ensure that sufficient head is available to open the valve fully. This assumes there is not pressure in the control chamber. The other factor to be aware of is that with the valve at the bottom of the reservoir and the float pilot at the top, the static head in the control tubing is the minimum pressure which can be achieved in the control tubing with the normal pilot hook-up. A "rule of thumb" which can be used to check this condition is as follows: The flowing line pressure in PSI should be greater than or equal to the vertical distance in feet between the valve and the float pilot. If any of the above low pressure conditions are not met, please contact Ultra sales staff who will assist. Because of the many variables which exist with Level control valves in both the sizing/application and physical installation, Ultra offer a complete installation service. The advantage of this is that total responsibility rests with Ultra who will ensure correct installation and ultimate commissioning with the main contractor.

FIG BT110-10
FLOAT CONTROL - MODULATING (CONSTANT LEVEL)

The FIG BT110-10 maintains a constant level in storage tanks and reservoirs. Valve controlled flow into the tank is proportional to discharge flow, keeping the tank full.

NOTE:
The modulating float control FIG BT110-10, is remote mounted unless specified valve mounted.
A stilling well around the float should be installed if the liquid surface is subject to turbulence, ripples or wind.

QUICK SIZING:
Valve size same as fill line or one size smaller if discharge line is smaller than the fill. Match size/capacity to discharge requirements. See comments on hydraulic considerations on Page 6.
Consult Ultra if in doubt.



VALVE FUNCTION
- Maintains a constant liquid level in a tank.
- Remote mounted pilot 020 is sensitive to slight changes in level and controls main valve:
 Opens when level drops
 Closes when level rises

- COMPONENTS**
1. Main Valve
 2. Fig. 10-11 Modulating Float Control
 3. Needle Valve - Adj. Closing Speed

- ACCESSORIES**
- | | | |
|----------------------|------------------------|-------------------------|
| Located as indicated | X - Isolation Cocks | FC - Flo-Clean Strainer |
| Included as marked | Y-Y - Strainer | L - Limit Switch |
| | P - Position Indicator | |

FIG BT110-14
FLOAT CONTROL-ON/OFF (OPEN/CLOSE)
ADJ. HI/LO LEVELS

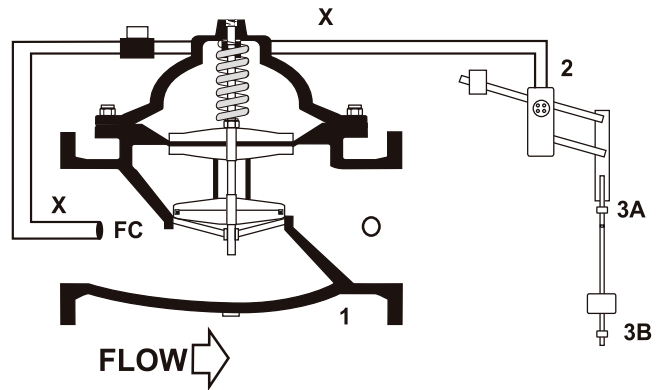
The FIG BT110-14 opens fully when the level reaches the preset low point and shuts off drip tight when the high level is reached. The on/off ball valve pilot is equipped with a vertical rod which allows the float to rise and drop to the adjustable upper and lower stops.

NOTE:
The pilot is remote mounted unless it is specified valve mounted. Standard equipped with brass rods and plastic floats. Stainless steel rods and floats are available. Provide a stilling well around the float if a liquid surface is subject to turbulence, ripples or wind.

SPECIFY:
Valve mounted pilot is required and valve discharge horizontal or vertical.

QUICK SIZING: Valve size same as fill line or one size smaller.

See comments on hydraulic considerations on Page 6.
Consult Floquip if in doubt.



VALVE FUNCTION
- Valve opens when float reaches lower level stop (adjustable)
- Valve closes when float reaches upper level stop (adjustable)
- High and low level adjustments allows for calculated draw down
 Opens when level drops
 Closes when level rises

- COMPONENTS**
1. Main Valve
 2. Fig. 10-13 Float Pilot
 3. Level Adjustment Stops
 - 3A - Upper Level
 - 3B - Lower Level

ACCESSORIES
Located as indicated
Included as marked
Large size valves may require and accelerates a Pilot.

- | |
|-------------------------|
| X - Isolation Cocks |
| Y-Y - Strainer |
| FC - Flo-Clean Strainer |
| L - Limit Switch |

FIG BT115
PRESSURE REDUCING

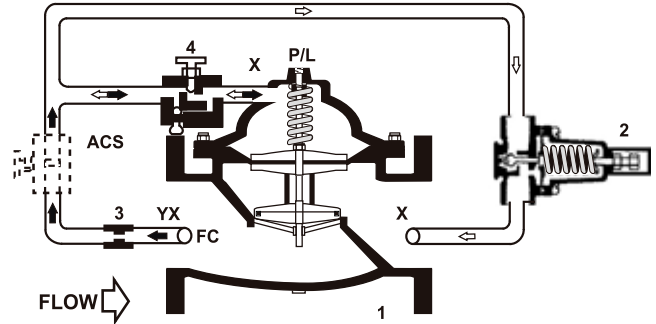
Automatically reduces a higher pressure to a constant lower outlet pressure regardless of changing flow rate and / or varying inlet pressure.
Refer to FIG BT115-7 for dead-end systems and / or systems using high demand, on-off equipment.

NOTE:
Adjustment range:
Standard: 20-1190 kPa
Optional: 0-638 kPa
 100-2040 kPa
(Stainless steel control)

QUICK SIZING:
Valve size one size smaller than line.

- Points to consider:**
- See Engineering Data - Pressure Reducing Sizing
 - Check maximum and minimum flow
 - Check pressure drop - pressure reducing valves or cavitation charts

Consult Ultra



Flow Direction Shown: Under the Seat
Optional 'R' Flow Over the Seat: 115-3R

VALVE FUNCTION
- Reduce higher inlet pressure to constant lower outlet pressure (adjustable)

- COMPONENTS**
1. Main Valve
 2. 263 Reducing Valve
 3. Fixed Orifice
 4. Flow Control - Adj. Opening Speed

- ACCESSORIES**
Located as indicated
Included as marked
- X - Isolation Cocks
 - Y - Y Strainer
 - P - Position Indicator
 - FC - Flo-Clean S trainer
 - L - Limit Switch
 - AOS - Adjustable Closing Speed

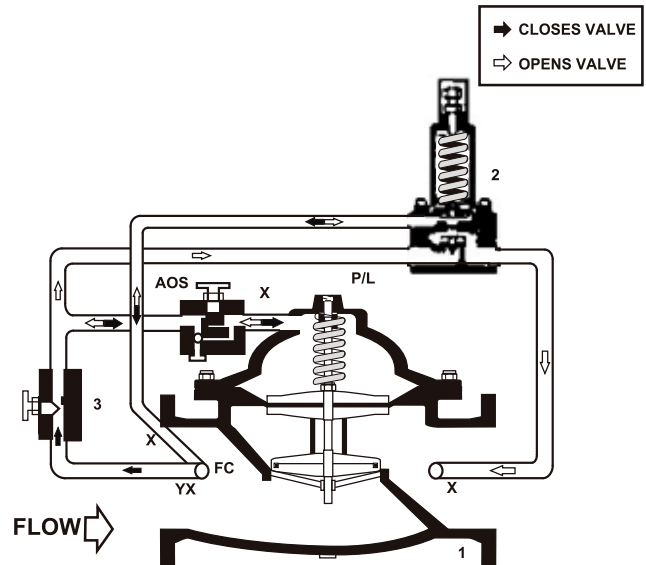
FIG BT116
PRESSURE RELIEF / SUSTAINING

Installed on a bypass line, mainline pressure is accurately controlled by relief of excess pressure. Installed in a mainline it prevents upstream pressure from dropping below a preset minimum.
For very fast reaction requirement refer to Ultra for info on gas loaded surge relief valve.

NOTE:
Adjustment range:
Standard: 20-1360 kPa
Optional: 0-204 kPa
 100-2040 kPa
Additional relief/sustaining functions:
-116FM/1116FM
(U.L. Listed/F.M. Approved for fire pump relief service)
-116-5 Pressure Sustaining / Check
-116-25 Differential Pressure Sustaining
-116-24 Differential Pressure Sustaining / Check

116 RELIEF
QUICK SIZING: Valve size one or two sizes smaller than main line.
Points to Consider:
Refer to Engineering Data - Flow Capacity Chart
Consult Floquip

116 SUSTAINING
QUICK SIZING: Valve size same as line.
Points to Consider:
Refer to Engineering Data - Flow Capacity Chart
Pressure drops at required flow
Refer to Engineering Data - Pressure Drop Chart



Flow Direction Shown: Under the Seat

VALVE FUNCTION
- Maintain constant upstream presS 16re (inlet to valve) by relieving excess Pressure.

- COMPONENTS**
1. Main Valve
 2. PV20C Sustaining Control
 3. Needle Valve - Adj. Closing Speed

- ACCESSORIES**
Located as indicated
Included as marked
- X - Isolation Cocks
 - Y - Y-Strainer
 - P - Position Indicator
 - FC - Flo-Clean S trainer
 - L - Limit Switch
 - AOS - Adj. Opening Speed

If the valve is to be used as a "safety" Relief valve the flow rates in the table can be exceeded.

Valve Size - mm	50	80	100	150	200	250	300	350	400	600
Maximum Continuous Flow Rate l/s (water)	13	30	50	114	200	310	440	540	695	1700
Maximum Intermittent Flow Rate l/s (water)	30	65	114	310	440	695	1010	1200	1580	2300

FIG B113-21
BOOSTER PUMP CONTROL (Valves 200mm and larger)

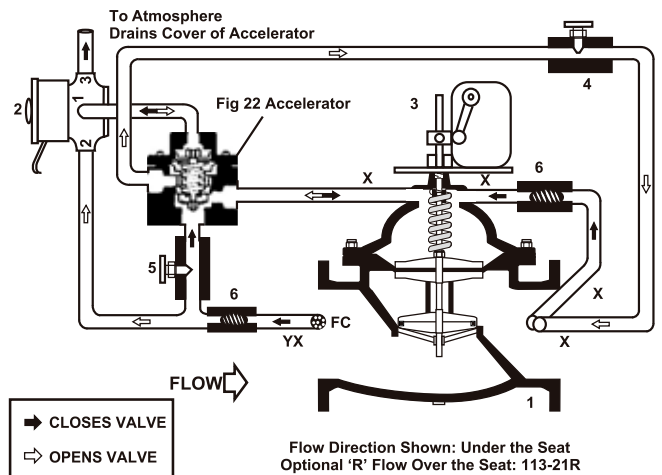
A solenoid operated pump control for controlled opening and closing on a pump start-up and shut down. Equipped with hydraulic check features to close valve on pressure reversal. Valve and pump operation are interlocked by a limit switch assembly.

NOTE:
Energized to open valve.
At time of order, advise factory actual system working pressure for correct solenoid selection.
110-120 VAC, 50-60 Hz standard
Optional: specify voltage required.
Solenoid enclosure NEMA 1,2,3,3S,4,4X
Optional: explosion proof NEMA 3,3,S,4,4X,6,6P,7,9
Manual operator standard
Limit switch enclosure general purposes
Optional: explosion proof.
Standard with adjustable opening and closing speed.

QUICK SIZING: Valve size same as line.

Points to consider:

Refer to Engineering Data - Flow Capacity Chart
Pressures drop at required flow
Refer to Engineering Data - Pressure Drop Chart



VALVE FUNCTION

- Opens at a controlled rate on pump start-up (adjustable)
- Closes at a controlled rate on pump shut-off (adjustable)
- Valve and pump are electrically interlocked so that power is shut-off when the valve is in near position
- Check feature closes valve when discharge pressure exceeds inlet pressure (Power failure or pump failure)

COMPONENTS

- 1. Main Valve
- 2. 3-Way Solenoid
- 3. Fig. 51 Limit Switch
- 4. Needle Valve - Adj. Opening Speed
- 5. Needle Valve - Adj. Closing Speed
- 6. Check Valve
- FC - Flow Clean Strainer

ACCESSORIES

- Located as indicated
- Included as marked
- X - Isolation Cocks
- FC - Flo-Cleaner Strainer
- Y - Y - Strainer

FIG B114
RATE OF FLOW

“R” Indicates flow over the seat (failed closed)

Maintains a constant flow rate, adjustable, regardless of fluctuations in line pressure. The rate of flow pilot senses the differential pressures across a thin edged orific, plate mounted in the valve inlet flange. It responds to change 3 s in pressure and modulates the main valve to maintain the desired flow.

SPECIFY:

Desired flow rates at time of order.
FIG 114R: Flow over the seat (fail closed)
FIG 114: Flow under the seat (fail open)

Additional combination functions:

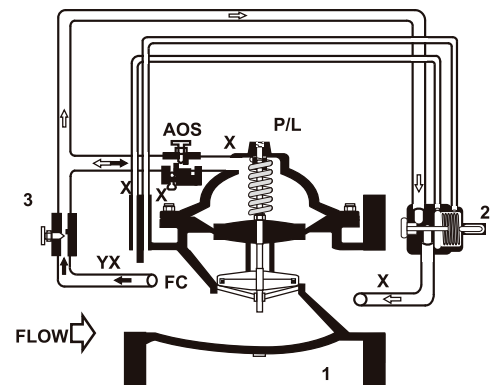
- 114-1R Rate of Flow / Solenoid On-Off
- 114-2R Rate of Flow / Pressure Reducing
- 114-8R Rate of Flow / Pressure Sustaining

QUICK SIZE: Stay within parameters of a capacity chart (below)

Points to consider:

Orifice plate sized per application and per your acceptable pressure

Valve Size - mm	50	80	100	150	200	250	300	350	400	600
Minimum Flow Rate Litre / Second	1	2	3	6	12	19	25	31	53	190
Maximum Flow Rate Litre / Second	14	30	50	115	200	310	440	550	700	1700



Flow Direction Shown: Over the Seat
Optional Flow Over the Seat: 114

VALVE FUNCTION

- Limits flow rate to a constant preset maximum (adjustable)

COMPONENTS

- 1. Main Valve
- 2. Figure 51 Limit Switch
- 3. Needle Valve - Adj. Closing Speed
- 4. Orifice Plate

ACCESSORIES

- Located as indicated
- Included as marked
- AOS - Adj. Opening Speed
- X - Isolation Cocks
- Y - Y Strainer
- FC - Flo-Clean Strainer
- P - Position Indicator
- L - Limit Switch

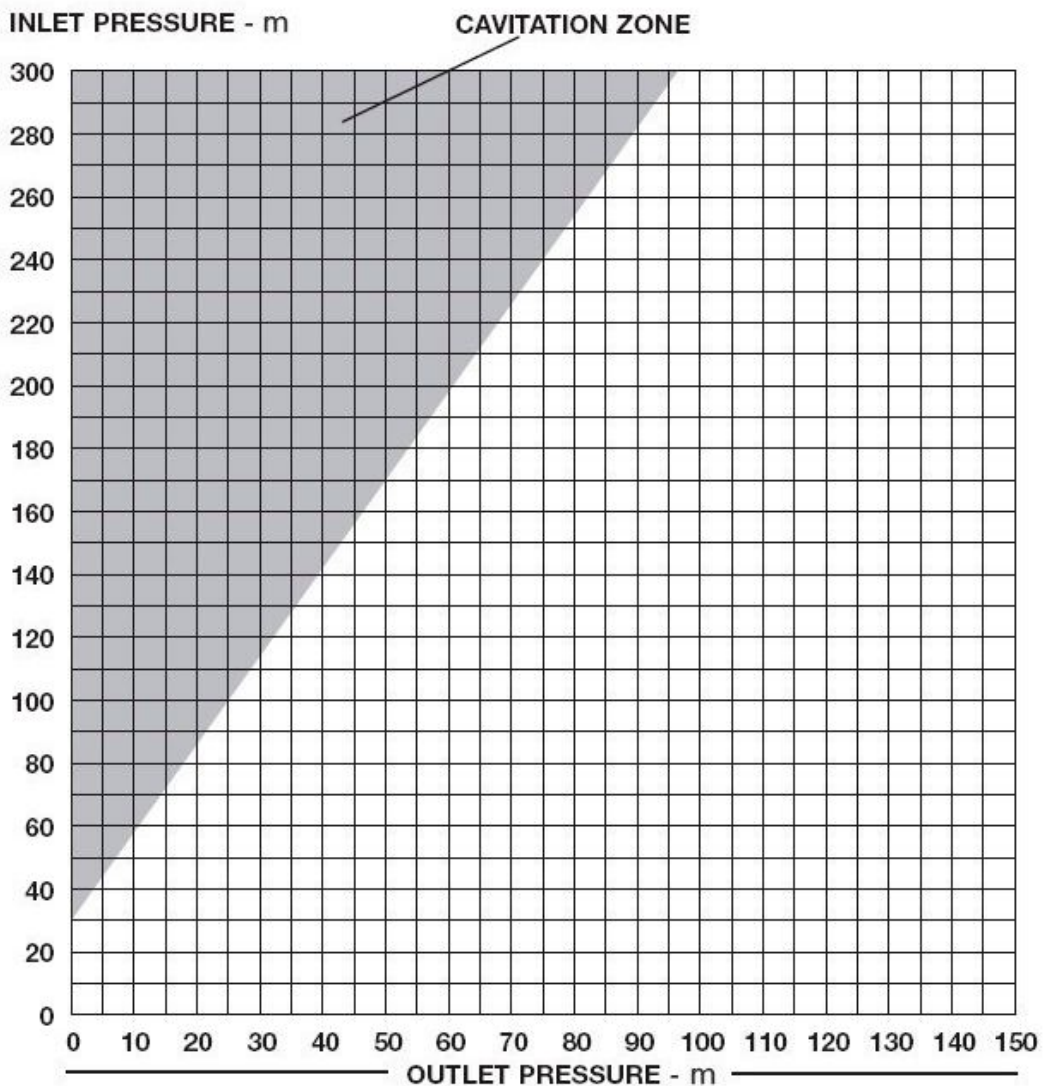
PRESSURE DROP INDEX - PRESSURE REDUCING VALVES

Calculate the pressure difference by subtracting the desired outlet pressure from the maximum inlet pressure. Find the number on the pressure difference line and note the outlet pressure index number. This is the lowest outlet pressure setting allowed without falling into the cavitation zone. Design of the Ultra Automatic Control Valve minimizes potential valve damage that can be caused by cavitation. Avoid continued operation within the cavitation zone

PRESSURE DIFFERENCE (Metres)													
7	14	21	28	34	41	48	55	62	69	86	103	121	138
OUTLET PRESSURE INDEX (Lowest Outlet Setting, Metres)													
0	0	0	2	6	10	14	17	21	25	35	45	55	64

CAVITATION CHART

After selecting valve size, locate inlet and outlet pressures on this chart. If the intersection point falls in the shaded area, cavitation can occur. Operation of valves continually in the cavitation zone should be avoided. Consult Ultra Control Valves for alternatives.



FLOW DATA 100 GLOBE

Valve size - mm	50	80	100	150	200	250	300	350	400	450	500	600	700	800
Maximum continuous flow rate l/s (water)	13	30	50	114	200	310	440	540	695	900	1150	1700	2400	3000
Maximum intermittent flow rate l/s (water)	17	36	63	145	250	380	545	665	885	1200	1500	2210	3000	3800
Minimum flow rate	0.06	1.9	3.2	7.0	13	19	25	32	41	63	78	113	154	201
CV in l/s KPa	1.3	3	5.3	11	19	29	41	51	67	85	115	170	240	300

Maximum continuous flow based on pipe line velocity of 6 metres per second.
 Maximum intermittent flow based on pipe line velocity of 7.6 metres per second.
 The Cv factor of a valve is the flow rate in litres per second at 20°C that will cause a 1 kPa drop in pressure.
 The factors stated are based upon a fully open valve.

Cv factor can be used in the following equations to determine flow (Q) and Pressure Drop (ΔP)

$$Q \text{ (flow)} = Cv \sqrt{\Delta P}$$

Q in L/s

$$\Delta P = (Q/Cv)^2$$

ΔP in kPa

$$Cv = \frac{Q}{\sqrt{\Delta P}}$$

Equivalent Length of Pipe (K factor)

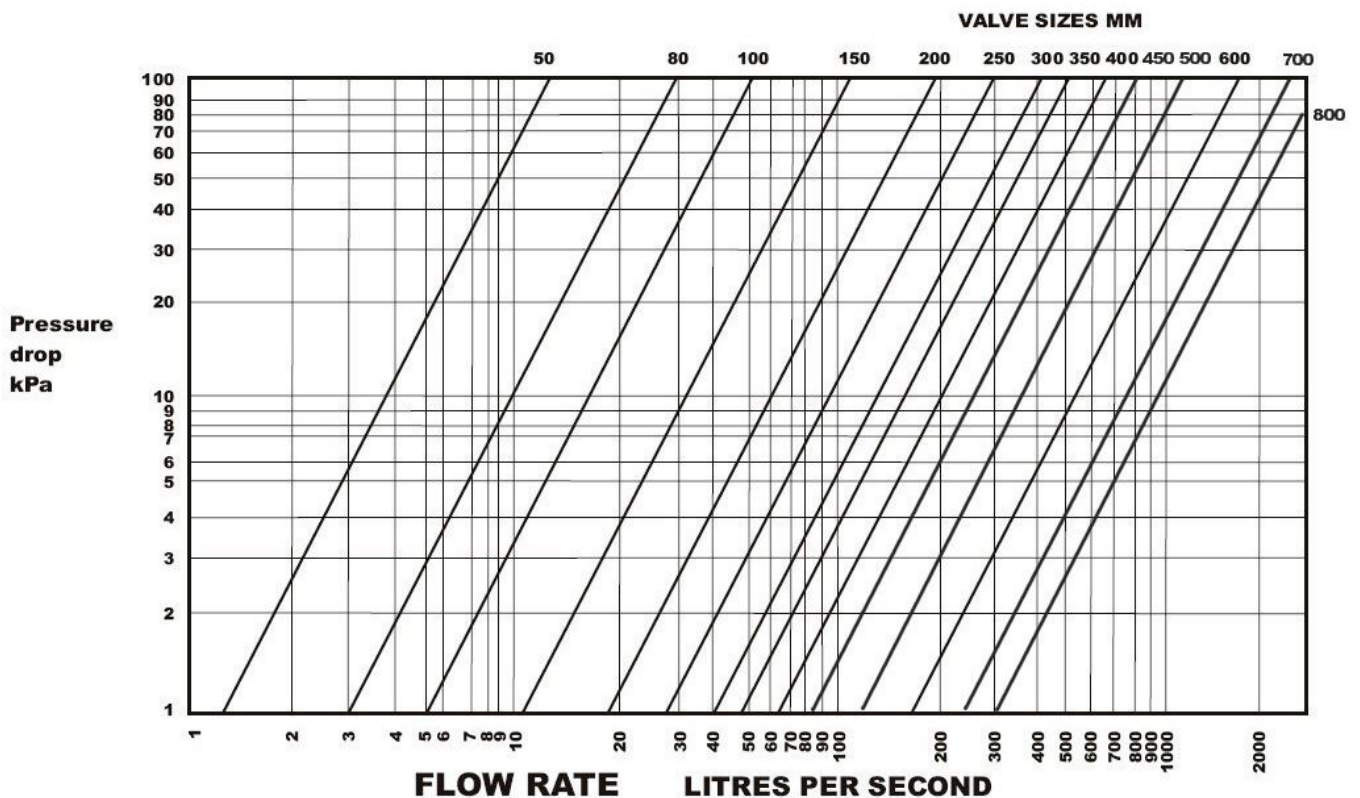
K is calculated from the formula $h = \frac{Kv^2}{2g}$

Where: h = friction loss in metres of water

v = average velocity in m/s in a pipe of corresponding diameter

g = 9.81 m/s/s

PRESSURE DROP CHART 100 GLOBE



ADDITIONAL ULTRA ACV PRODUCTS



Ultra ACV Ratio Reducing valve

The Ultra ACV Ratio Reducing valve consists of a Piston inside a body with no external piloting and which cannot be adjusted or tampered with. The valve simply reduces an upstream pressure to a downstream pressure in the Ratio chosen ie if upstream pressure is say 20bar you can reduce this pressure to 10bar by choosing a 2:1 Ratio Reducing valve or 20bar to 6.7bar by choosing a 3:1 Ratio Reducing valve. The Ratio Reducing valve is the simplest form of Pressure Reduction and if used in the right applications, will provide many years of problem free operation.

Sizes: 50mm to 200mm
Pressure rating: 16bar, 25bar
Material: Ductile Iron with St St trim



Ultra ACV Direct Acting Pressure Reducing valve

The Ultra ACV Direct Acting Pressure Reducing valve is used where adjustability is required but a simpler solution is desired.

Sizes: 15mm to 400mm
Pressure rating: 10bar to 64bar

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