ULTRA ACV
AUTOMATIC WATER CONTROL VALVES
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 design 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 Ultra ACV) 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.
Dimension Data

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<th>B</th>
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Materials of Construction

Basic Valve components Specifications

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<tr>
<th>Cover</th>
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<tbody>
<tr>
<td>Bearing</td>
<td>Copper</td>
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<tr>
<td>Spring</td>
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<tr>
<td>Stem nut</td>
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<td>Diaphragm washer</td>
<td>Cast steel</td>
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<td>Stud</td>
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<tr>
<td>Stud nut</td>
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<td>Diaphragm**</td>
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<tr>
<td>Body</td>
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<tr>
<td>Quad ring retainer</td>
<td>Cast steel</td>
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<tr>
<td>Quad ring seal**</td>
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<tr>
<td>Seat</td>
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<td>Seat gasket</td>
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<tr>
<td>Quad ring washer</td>
<td>Ductile iron</td>
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<tr>
<td>Stem</td>
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<tr>
<td>Spacer (150-400mm)</td>
<td>Ductile iron</td>
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<tr>
<td>O ring**</td>
<td>NBR</td>
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** 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 singularly or in combination with each other to provide any conceivable operation that may be required for regulating the flow of water.

Functions
Up to 1500 combinations of pilot arrangements are available with comparison model numbers of main competitors:

<table>
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<tr>
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<th>Cla-Val</th>
<th>Ultra ACV</th>
<th>Description</th>
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<tr>
<td>770</td>
<td>40-01</td>
<td>114</td>
<td>Rate of Flow Control</td>
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<td>730</td>
<td>50-01</td>
<td>116</td>
<td>Pressure Relief / Sustaining</td>
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<td>51-01</td>
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<td>Pressure Sustaining &amp; Check</td>
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<td>735</td>
<td>52-03</td>
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<td>Surge Anticipator</td>
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<td>Dual Chamber Booster Pump Control</td>
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<td>61-02</td>
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<td>Deep Well Pump Control</td>
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<td>81-02</td>
<td>118-3</td>
<td>Non-Surge Check Valve with opening and closing speed controls</td>
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<td>Modulating Float Control</td>
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<td>136-01A</td>
<td>113-12</td>
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<td>750-87</td>
<td>210-06</td>
<td>127-2</td>
<td>Two Way Flow Altitude Control</td>
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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.
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 Ultra ACV 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 200mm).

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 it’s 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 4 bar 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 pilot 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 5:1.

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 chamber 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.
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.

Fig BT110-10 Modulating (Constant Level)

Flow Direction Shown: Under the Seat
Optional 'R' Flow Over the Seat

CLOSES VALVE
OPENS VALVE

FLOW

Fig BT110-10 Modulating Float Control

Valve size same as fill line or one size smaller if discharge line is smaller than the fill. Match size/capacity to discharge requirements.

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: If the Pilot is to be mounted on the valve. Contact Ultra staff if unsure about anything.

Quick Sizing: Valve size same as fill line.

Fig BT110-14 Float Control-On/Off (Open/Close) Adj. Hi/Lo Levels

Valve size same as fill line.
Fig BT127-1
Altitude Valve - One Way (Tank Fill)
Provides automatic filling of elevated tanks or reservoirs. When the altitude control senses a drop in level below the predetermined set-point, the valve opens to fill the tank. Supply pressure must be greater than static head pressure. Discharge of the tank is by a separate line.

Adjustable ranges: 1.5m - 6m
3m - 22m
15m - 60m

Quick Sizing: Valve size, line size or one size smaller.

Components
1. Main Valve
2. Fig. 22-1 Accelerator Control for sizes larger than 150mm.
3. Fig. 27 Altitude Control
4. Check Valve
5. Needle Valve - Adj. Opening Speed
6. Needle Valve - Adj. Closing Speed
7. 3-Way Ball Valve
8. Position Indicator
9. FC - Flo-Clean Strainer

Valve Function
- Closes when reservoir level reaches pilot setting
- Opens approximately 300mm lower.

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

Fig BT127-1
Altitude Valve - Two Way Flows (Tank Fill & Discharge)
Provides automatic filling of elevated tanks or reservoirs. Supply pressure must be greater than static head pressure. When the altitude control senses a drop in level below the predetermined set-point, the valve opens to fill the tank. The valve opens for tank discharge when tank head pressure is greater than valve inlet pressure.

Adjustment ranges: 1.5m - 6m
3m - 22m
15m - 60m

Quick Sizing: Valve size, line size or one size smaller.

Points to consider: Tank discharge flow requires a valve inlet (system pressure) to be 13 kPa less than tank head pressure.

Components
1. Main Valve
2. Fig. 22-1 Accelerator Control for sizes larger than 150mm.
3. Fig. 27 Altitude Control
4. Check Valve
5. Needle Valve - Adj. Opening Speed
6. Needle Valve - Adj. Closing Speed
7. 3-Way Ball Valve
8. Position Indicator
9. FC - Flo-Clean Strainer

Valve Function
- Tank fill
- Opens when reservoir level drops below pilot setting (adjustable)
- Closes when reservoir level reaches pilot setting
- Tank Discharge
- Opens when valve inlet / system pressure is below tank head pressure

Accessories
- X - Isolation Cocks
- Y - Y Strainer
- FC - Flo-Clean Stainer
- 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

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: 20-1350 kPa
Optional: 0-204 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

If the valve is to be used as a "safety" Relief valve the flow rates in the table can be exceeded.
**FIG BTI13-12**

**Solenoid On/Off (Open/Close)**

Operated by a 3-way solenoid, the main valve opens fully or closed drip-tight depending upon the actuation position of the solenoid, energized to open/energized to close. The valve may be remotely operated by timers, relays, probes or any triggered device to the solenoid. The valve can be operated with 2 x 2-way solenoids for modulating control from a PLC.

**NOTE:**
- Energized to open valve.
- Optional: energized to close valve.
- At time of order, advise our factory manager of your system working pressure for correct solenoid selection.
- 110-220 VAC, 50-60 Hz standard
- Optional: specify voltage required.
- Enclosure General Purpose (NEMA 1,2,3,3S,4,4X)
- Optional: explosion proof (NEMA 3,3S,4,4X,6,6P,7,9)
- Manual operator standard
- Optional: Opening and/or closing speed.

**Quick Sizing:** Valve size same as line or one size smaller.

**Points to consider:**
- Refer to Engineering Data - Flow Capacity Chart
- Pressures drop at required flow
- Refer to Engineering Data - Pressure Drop Chart

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**FIG BTI13-6**

**Solenoid On/Off (Open/Close)**

This configuration has an accelerator pilot to speed up valve reaction time if required. A 3-way solenoid and auxiliary 3-port accelerator cause the main valve to open fully or close drip-tight depending upon the actuation position of the solenoid, energized to open/energized to close. The high capacity accelerator assures quick valve response to the solenoid signal regardless of the main valve size. The valve may be remotely operated by timers, relays, probes or any triggering device to the solenoid.

**NOTE:**
- Energized to open valve.
- Optional: energized to close valve.
- At time of order, advise factory actual system working pressure for correct solenoid selection.
- 110-220 VAC, 50-60 Hz standard
- Optional: specify voltage required.
- Enclosure General Purpose (NEMA 1,2,3,3S,4,4X)
- Optional: explosion proof (NEMA 3,3S,4,4X,6,6P,7,9)
- Manual operator standard
- Optional: Opening and/or closing speed.

**Quick Sizing:** Valve size same as line or one size smaller.

**Points to consider:**
- Refer to Engineering Data - Flow Capacity Chart
- Pressures drop at required flow
- Refer to Engineering Data - Pressure Drop Chart
FIG BT113-46
Booster Pump Control (Valves 150mm and smaller)
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 and shut-off pumps in an event of pump failure. Valve and pump operations 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 3,3S,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

FIG BT113-21
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 3,3S,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 pumps are electrically interlocked so that power is shut-off when the valve is in near closed position
- Check feature closes valve when discharge pressure exceeds inlet pressure (Power failure or pump failure)

Accessories
Located as indicated
Included as marked
**FIG BT413-21**

**Booster Pump Control / Mechanical Lift Check**

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 and shut-off pump in an event of pump failure. Valve and pump operations are Interlocked by a limit switch assembly.

**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

**NOTE:**
- Energized to open valve.
- At time of order, advise factory actual system working pressure for correct solenoid selection.
- 110-220 VAC, 50-60 Hz standard
- Optional: specify voltage required.
- Solenoid enclosure NEMA 1,2,3,3S,4,4X
- Optional: explosion proof NEMA 3,3S,4,4X,6,6P,7,9
- Manual operator standard
- Limit switch enclosure general purposes
- Optional: explosion proof.
- Standard with adjustable opening and closing speed.

**FIG BT513-5**

**Booster Pump Control / Dual Chamber / Lift Check**

A solenoid operated pump control for controlled opening and closing on a pump start-up and shut down. Built on the dual chamber Ultra ACV 518 main valve. Equipped with mechanical lift-check features to close valve the moment flow stops, preventing pressure reversal. Valve and pump operations are Interlocked by a limit switch assembly.

**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

**NOTE:**
- Energized to open valve.
- 110-220 VAC, 50-60 Hz standard
- Optional: specify voltage required.
- Solenoid enclosure NEMA 1,2,3,3S,4,4X
- Optional: explosion proof NEMA 3,3S,4,4X,6,6P,7,9
- Manual operator standard
- Limit switch enclosure general purposes
- Optional: explosion proof.
- Standard with adjustable opening and closing speed.

**COMPONENTS**
- 1. Main Valve Opening Speed
- 2. 3-Way Solenoid
- 3. Fig. 22-1 Accelerator Control
- 4. Needle Valve - Adj. Closing Speed
- 6. Check Valve
- 7. Fig. S1 Limit Switch

**ACCESSORIES**
- Located as indicated
- Included as marked

**FIGS**
- X - Isolation Cocks
- Y - Y Strainer
- FC - Flo-Cleaner Strainer
**FIG BT114**

**Rate Of Flow**

"R" indicates flow over the seat (fail 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 orifice plate mounted in the valve inlet flange. It responds to changes 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 Sizing:** Stay within parameters of a capacity chart (below)

**Points to consider:**

- Orifice plate sized per application and per your acceptable pressure drop. For better accuracy the Orifice Plate should be installed on the valve inlet.

**Valve Function**

Limits flow rate to a constant preset maximum (adjustable)

**Components**

1. Main Valve
2. Fi 14 Rate of Flow control pilot
3. Needle Valve - Adj. Closing Speed
4. Orifice Plate

**Accessories**

- **AOS** - Adj. Opening Speed
- **X** - Isolation Cocks
- **Y** - Y Strainer
- **FC** - Flo-Clean Strainer
- **P** - Position Indicator
- **L** - Limit Switch

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

**Maric Flow Control Valves**

A totally different form of Flow Control (called Maric) is also available from Ultra. This product was developed in Australia and has been evolved into one of the best forms of Flow Control available. The bodies are now manufactured in South Africa.

**Its benefits are:**

- Simplicity
- Tamperproof
- Self Cleaning
- Non-Adjustable

The Maric is available in many different body configurations as per picture.

Pressure rating: Up to 25bar

Sizes: from 10mm to 400mm

Used on Higher pressure systems (such as Gland service water) together with Pressure control systems. Check with Ultra staff.
FIG BT116-52
Surge Anticipator Relief / Remote Sense
Used in pumping systems to protect equipment from damaging pressure surges or waves caused by rapid changes of flow within the pipeline. The 116-52 responds by opening at a preset low pressure setting, allowing for quick relief of the returning high pressure wave. The valve remains open as the integral accumulator is charged and then closes. This prevents possible excess system drainage should pressure not return to/above the low pressure setting. It is also equipped with a high pressure control pilot which allows for high pressure relief service.

NOTE:
Adjustment range:
Low pressure: standard 20-1360 kPa, optional 0-204 kPa.
High pressure: standard 20-1360 kPa, optional 0-204, 100-2040 kPa

Quick Sizing: Rule of thumb says 1/3 of Pipe size. If critical discuss with Ultra Staff.

Ultra also supply a locally manufactured Gas Loaded Surge Relief Valve for pressures up to 150bar.

Valve Size - mm 50 80 100 150 200 300 400 500
Maximum Continuous Flow Rate l/s (water) 13 30 50 114 200 310 440 695
Maximum Intermittent Flow Rate l/s (water) 30 65 114 310 440 695 1010 1580

FIG BT118-3R
Check Valve W/Separate Opening & Closing Speed Controls
Valves 100mm & smaller (150mm & larger uses 118-4R)
The FIG 118-3R permits flow when inlet pressure exceeds outlet pressure. Should pressure reversal occur the valve closes drip-tight. Opening and closing speeds are separately adjustable.

118 - R - no speed control
118 - 1R - no closing speed (Sizes 50 - 150mm)
118 - 2R - opening speed (Sizes 50 - 150mm)
118 - 3R - separate adjustable opening and closing speed 100mm & smaller
118 - 4R - separate 150mm & larger.

Quick Sizing: Valve size same as line.

Points to consider:
Distribution flow:
- Refer to Engineering Data - Flow Capacity Chart
- Pressure drops at required flow.
- Refer to Engineering Data - Pressure Drop Chart

Check Flow
- If Check flow velocity exceeds a valve chart, consider adding a Relief Valve FIG 116 to your system.
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. If upstream pressure is say 20 bar you can reduce this pressure to 10 bar by choosing a 2:1 Ratio Reducing valve or 20 bar to 6.7 bar 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.

Available in:
Sizes: 50mm to 250mm
Pressure ratings: 16 bar, 25 bar, 40 bar
Available Ratio’s: 2:1, 3:1, 4:1, 5:1 and fractions if required
Accuracy: Approximately 10%

<table>
<thead>
<tr>
<th>Size</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>50mm</td>
<td>80</td>
</tr>
<tr>
<td>80mm</td>
<td>110</td>
</tr>
<tr>
<td>100mm</td>
<td>120</td>
</tr>
<tr>
<td>150mm</td>
<td>160</td>
</tr>
<tr>
<td>200mm</td>
<td>200</td>
</tr>
<tr>
<td>250mm</td>
<td>250</td>
</tr>
</tbody>
</table>

* L given is for 16 bar valves
For higher pressures L is longer by the increased flange thickness

<table>
<thead>
<tr>
<th>Material of Construction Alternatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body</td>
</tr>
<tr>
<td>Piston</td>
</tr>
<tr>
<td>Main Seal</td>
</tr>
</tbody>
</table>

1. Body
2. Piston
3. O-ring
4. Main Seal
Ultra 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.

Available in:
Sizes: 15mm to 200mm
Pressure rating: 16bar, 25bar, 40bar, 64bar, 100bar
Standard body material: WCB Steel 316 SS available

<table>
<thead>
<tr>
<th>Size</th>
<th>L</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>15mm</td>
<td>16</td>
<td>40</td>
</tr>
<tr>
<td>20mm</td>
<td>160</td>
<td>310</td>
</tr>
<tr>
<td>25mm</td>
<td>180</td>
<td>350</td>
</tr>
<tr>
<td>32mm</td>
<td>200</td>
<td>445</td>
</tr>
<tr>
<td>50mm</td>
<td>250</td>
<td>465</td>
</tr>
<tr>
<td>80mm</td>
<td>310</td>
<td>500</td>
</tr>
<tr>
<td>100mm</td>
<td>350</td>
<td>545</td>
</tr>
<tr>
<td>150mm</td>
<td>450</td>
<td>865</td>
</tr>
</tbody>
</table>

Parts List
1. Body
2. Bottom Cover
3. Gasket
4. Nut
5. Disc
6. Sealing Ring
7. Seat
8. Stem
9. O-ring
10. Gasket
11. O-ring
12. Cylinder Liner
13. Bolt
14. Nut
15. O-ring
16. O-ring
17. Spring Washer
18. Nut
19. Adjusting Spring
20. Upper Cover
21. Spring Retainer
22. Adjusting Screw
23. Cover
**INSTALLATION RECOMMENDATIONS**

**Valve Sizing - Pressure Reducing**
Selection of the correct size pressure reducing valve is a relatively simple process. Criteria for selection are minimum flow, normal flow, maximum flow and pressure drop across the valve. Following are explanations of the three types of PRV installations. These also apply to any functions combined with the reducing function, such as reducing/check and reducing/solenoid valves. A Relief valve should be installed downstream for dead-end service.

**Single Valve Installation**
A single reducing valve can be applied if operating flow, requirements are within the capacity of one size valve, and pressure drops are outside the Cavitation Zone.
1. Select the valve size from SIZING CHART that is within the range of low to high flow. (Consider requirements of lowest demand equipment).
2. Check Pressure Drop (inlet-outlet) to insure that desired outlet pressure is above the recommended lowest outlet setting to avoid cavitation conditions. (Check Cavitation Chart page 26).

**Parallel Installation**
If flow requirement fall outside the capacity of a single valve, an additional smaller valve installed in parallel may be required. In parallel installations, the larger valve handles the requirements for maximum flow down to its low flow capacity. The small valve extends to the sum of the maximum flow of both valves.
1. Select the valve size combinations from SIZING CHART that is within low to high flow system range.
2. Check Pressure Drop (inlet-outlet) to confirm desired outlet pressure is above index psig, or check Cavitation Chart.

**Series installation**
If pressure drop requirements cause the outlet pressure to be below the index psig, or fall in the Cavitation Zone, then two valves in series may be required. Each valve will function outside the cavitation zone to safely drop the high inlet pressure, in two steps, to the desired outlet pressure. Valve size is based upon the Minimum - Maximum flow ranges previously explained. Consult Baker representative for these applications.

**SPECIAL CONSIDERATIONS**

**Float Valves**
- Installing valves over open tanks should be avoided due to possible servicing problems.
- Install stilling wells around floats to protect them from turbulence.
- Remote mounted float controls should be connected to the main valve with a minimum of 3/8” tubing.

**Solenoid Valves**
- Electrical wiring should conform to NEMA codes to assure proper valve operation and longevity.

**Rate Of Flow Valves**
- A butterfly isolation valve cannot be installed directly to the valve inlet flange, as the disc will contact the orifice plate. A gate or ball type valve can be used or the isolation valve can be installed further upstream.

**Altitude Valves**
- Install the valve as close to the tank as possible, a maximum of 40 pipe diameters to assure accurate control.
- A sense line is required to connect the altitude control to the tank. To provide accurate reading of head pressure, the line should connect at the base of the water column. Minimum sense line size is ½”. A shut-off valve should be installed in this line for service and start-up.

Ultra also have exclusive rights to an Israeli Control valve called C-Valve. This valve has very special features which allows it to handle a much wider range of Flows and Pressure drops than the standard control valve (like Ultra ACV). For more information visit [www.ultravalves.co.za](http://www.ultravalves.co.za) or contact Ultra Staff.
**Valve Cover Chamber Capacity**

The chamber between cover and diaphragm is capable of holding the following volume of liquid. This chamber discharges liquid to open valve and must be filled to close valve. If your application requires the valve to discharge to atmosphere this information will be helpful to size drains or discharges lines. These volumes can also be used to calculate time of closure (or opening).

<table>
<thead>
<tr>
<th>Valve Size - mm</th>
<th>50</th>
<th>80</th>
<th>100</th>
<th>150</th>
<th>200</th>
<th>250</th>
<th>300</th>
<th>350</th>
<th>400</th>
<th>600</th>
</tr>
</thead>
<tbody>
<tr>
<td>Litres</td>
<td>0.121</td>
<td>0.163</td>
<td>0.303</td>
<td>0.644</td>
<td>2</td>
<td>4.7</td>
<td>9.5</td>
<td>15.1</td>
<td>24.6</td>
<td>36</td>
</tr>
</tbody>
</table>

**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.
Flow Data 100 Globe

<table>
<thead>
<tr>
<th>Valve size - mm</th>
<th>50</th>
<th>80</th>
<th>100</th>
<th>150</th>
<th>200</th>
<th>250</th>
<th>300</th>
<th>350</th>
<th>400</th>
<th>450</th>
<th>500</th>
<th>600</th>
<th>700</th>
<th>800</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum continous flow rate l/s (water)</td>
<td>13</td>
<td>30</td>
<td>50</td>
<td>114</td>
<td>200</td>
<td>310</td>
<td>440</td>
<td>540</td>
<td>695</td>
<td>900</td>
<td>1150</td>
<td>1700</td>
<td>2400</td>
<td>3000</td>
</tr>
<tr>
<td>Maximum intermittent flow rate l/s (water)</td>
<td>17</td>
<td>36</td>
<td>63</td>
<td>145</td>
<td>250</td>
<td>380</td>
<td>545</td>
<td>665</td>
<td>885</td>
<td>1200</td>
<td>1500</td>
<td>2210</td>
<td>3000</td>
<td>3800</td>
</tr>
<tr>
<td>Minimum flow rate</td>
<td>0.06</td>
<td>1.9</td>
<td>3.2</td>
<td>7.0</td>
<td>13</td>
<td>19</td>
<td>25</td>
<td>32</td>
<td>41</td>
<td>63</td>
<td>78</td>
<td>113</td>
<td>154</td>
<td>201</td>
</tr>
</tbody>
</table>

CV in l/s KPa

| Flow Data 100 Globe | 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):

\[ Q \text{ (flow)} = Cv \Delta P \]

\[ ΔP = \frac{Q}{Cv} \]

Equivalent Length of Pipe (K factor)

\[ K \text{ is calculated from the formula: } h = \frac{Kv^2}{2g} \]

Where:

- \( h \) = friction loss in metres of water
- \( v \) = average velocity in m/s in a pipe of corresponding diameter
- \( g = 9.81 \text{ m/s/s} \)

Pressure Drop Chart 100 Globe
**A New Era in Water Control**

The C-Valve presents a totally new philosophy in Water Control with accuracy, repeatability and stability unheard of in Standard Control valves. Features as follows:

- Very wide and stable flow range from almost zero to 20% higher than standard valves
- Very high Pressure drop without cavitation due to axial flow
- Very fast response makes it a fast Pilot operated Relief valve
- High resistance to Corrosion
- Prevents Surges by closing fast up to 20% of closed and then much slower
- High Corrosion and Erosion resistance means low maintenance.
- Manifolded to make up larger valves (up to 400mm) - provides flexibility
- Can choose normally open or normally closed operation to determine “fail safe” mode
- Available in sizes 50, 80, 100, 150mm and then installed in multiple versions to make up to a 400mm valve.
- Available up to 30bar pressure rating
- All normal applications such as Pressure Reducing, Pressure Relief, Level Control, Flow Rate control, Solenoid Control, Pump Control and combinations.
- C-Valves have become a Global player in the Pressure Management arena due to its unique features of stable control over a wide range and which can only be achieved by standard valves through expensive and complicated additions.

### Dimensions and Weights

Length may change. Please check with C-Valves applications department before preparing the site for installation. Stainless steel QC Couplings are available per request. Stainless steel bolts and nuts for cast iron QC couplings are available per request.

**M3 (Grooved Connection PN25)**

<table>
<thead>
<tr>
<th>Valve diameter (mm)</th>
<th>50mm with base plate</th>
<th>50mm</th>
<th>80mm</th>
<th>80mm with base plate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve PN (Bars)</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Length (mm)</td>
<td>205</td>
<td>251</td>
<td>375</td>
<td>395</td>
</tr>
<tr>
<td>Width (mm)</td>
<td>160</td>
<td>270</td>
<td>160</td>
<td>270</td>
</tr>
<tr>
<td>Weight of grooved valve (kg)</td>
<td>2.332</td>
<td>7.260</td>
<td>1.884</td>
<td>6.870</td>
</tr>
</tbody>
</table>

**M1 (Grooved Connection PN16/20/25)**

<table>
<thead>
<tr>
<th>Valve diameter (mm)</th>
<th>100</th>
<th>100</th>
<th>100</th>
<th>150</th>
<th>150</th>
<th>150</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve PN (bars)</td>
<td>16</td>
<td>20</td>
<td>25</td>
<td>16</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>Length (mm)</td>
<td>375</td>
<td>374</td>
<td>375</td>
<td>395</td>
<td>396</td>
<td>396</td>
</tr>
<tr>
<td>Width (mm)</td>
<td>227</td>
<td>227</td>
<td>227</td>
<td>227</td>
<td>227</td>
<td>227</td>
</tr>
<tr>
<td>Weight of grooved valve (kg)</td>
<td>13</td>
<td>13</td>
<td>15.6</td>
<td>17.9</td>
<td>18.9</td>
<td>20</td>
</tr>
</tbody>
</table>

Contact Ultra Control Valves for assistance with sizing and applications.
Ultra have various agents around South Africa and in neighbouring countries. Contact Ultra Head Office for agent in your area.