AUTOMATIC CONTROL VALVES

“Apollo” Valves
Made In The USA

American Made Quality since 1928
A history of Quality, Service and Innovation

Now in its ninth decade, Conbraco Industries, Inc. is a leading manufacturer of flow control products for U.S. and international markets. The company’s headquarters is based in Matthews, North Carolina with manufacturing plants and foundries located in Pageland and Conway, South Carolina.

Conbraco has a history of new product development and innovation that dates back to the company’s inception in 1928. Today, the Conbraco line of products is marketed under the “Apollo Valves” brand and includes: ball valves, butterfly valves, backflow prevention devices, water pressure reducing valves, mixing valves, safety relief valves, water gauges, strainers, actuation and APOLLOXPRESS® products.

Conbraco’s vertically integrated manufacturing ensures a consistency of production, testing, quality and availability. You can be assured that Conbraco flow control products will deliver long term reliability. All manufacturing facilities are ISO 9001:2008 certified.

The Conbraco line continues to expand with new products, designs and advanced materials to better serve the needs of our customers. Markets served include: chemical processing, pulp and paper, petroleum, residential and commercial plumbing and heating, OEM, irrigation, water works, and fire protection.

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(Full Port & Reduced Port Valves)
Basic Control Valve

The Apollo Basic Control Valve is a diaphragm actuated, engineered valve. When equipped with a variety of pilots and accessories the valve performs a wide range of automatic fluid control, making it a specified valve in municipal water, fire protection, irrigation, industrial, petroleum and aviation fueling systems.

The Apollo Control Valve is dependable and hard working; with a simplicity of design that ensures minimal part wear with exceptional performance and longevity. Self-contained, the valve operates automatically utilizing line pressure.

The Apollo Control Valve consists of three major components: body, bonnet and diaphragm assembly.

FEATURES:
• Operates automatically utilizing line pressure.
• Heavy-duty, nylon-reinforced diaphragm isolates top chamber operating pressure from bottom chamber line pressure.
• Rectangular-shaped, soft seat seal provides drip-tight Class VI closure.
• Diaphragm assembly guided top and bottom.
• Throttling seat retainer for flow and pressure stability.
• Easily maintained without removal from the line.
• Diaphragm replaceable without removing internal stem assembly.
• Replaceable seat ring.
• Stainless steel alignment pins assure proper reassembly after maintenance.
• Center-tapped bonnet facilitates installation of position indicator or valve-actuated switches.
• Ductile-tapped bonnet facilitates installation of position indicator or valve-actuated switches.
• Diaphragm replaceable without removing internal stem assembly.
• Replaceable seat ring.
• Stainless steel alignment pins assure proper reassembly after maintenance.
• Center-tapped bonnet facilitates installation of position indicator or valve-actuated switches.
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• Replaceable seat ring.
• Stainless steel alignment pins assure proper reassembly after maintenance.
• Center-tapped bonnet facilitates installation of position indicator or valve-actuated switches.
• Ductile-tapped bonnet facilitates installation of position indicator or valve-actuated switches.

OPERATION:

VALVE CLOSED
When line pressure from the valve inlet is applied to the cover chamber, pressuring the diaphragm, the valve is closed drip-tight.

VALVE OPEN
When diaphragm chamber pressure is vented the valve travels to the full open position.

VALVE MODULATING
The valve is between full open and closed. The valve’s control pilot modulates the pressure in the diaphragm chamber, positioning the valve to control the desired pressure or flow.

Reduced Port Valve

The A765 Control Valve is a globe pattern, reduced port engineered valve. The body, bonnet, internals and seat area are a size smaller than the flange size. Reduced port valves address the need for correctly sized valves without the use of pipeline reducers, allowing the valve to handle an application that demands flow rates of a smaller valve. An example would be an application where the flow rate dictates a 3” valve is used but the line size is 4 inches; thus a Model A765, 4” flanged body with 3” internals appropriately fits this condition.

Reduced port valves are available in most Apollo valve series. Valve models using the reduced port basic valve start with a number 7. For example: Model A127 (full port pressure reducing) would become a Model A727 (reduced port pressure reducing).
Pressure Reducing Valves

The APOLLO Basic Valve Model A65/A765 when fitted with an external control pilot circuit becomes a very effective pilot operated pressure reducing valve. These “pilot operated regulators” reduce a higher inlet pressure to a constant outlet pressure over a wide range of demand without the pressure “fall-off” characteristic of direct acting regulators. They offer a much higher flow capacity than “direct acting” types and are therefore sized differently; refer to sizing guidelines. (Pages 6 and 7) They can provide additional hydraulic control functions, increasing the versatility of the valve. The Apollo series of pressure reducing valves fall into three distinct types of applications, each of which is defined by their flow characteristics.

**A129/A729, A129LF/A729LF**
- Valves are located in domestic supply lines
- Flow rates are driven by plumbing fixtures
- Demand may range from zero to moderate
- Water usage can vary greatly depending on time of day
- Piping is typically sized for 100% usage of fixtures that realistically never occurs
- Supply may be from city water pressure and/or pumps

**SIZING GUIDELINES**
- Minimum demand is a more important consideration than maximum demand!
- Line sized valves are rarely necessary
- Avoid sizing valves for anticipated future demand
- If more than one PRV is feeding the same zone, divide the total zone demand by the number of PRV’s
- Refer to the Sizing Charts and contact your Apollo representative for assistance

**RECOMMENDED APOLLO MODELS**

**A129 / A729**
- 3-way pilot closes valve quickly when outlet pressure rises due to loss of flow
- Simple outlet pressure adjustable from 20-200 psi
- Pilot system strainer and isolation ball valves
- Manual air bleed valve
- Outlet pressure gauge
- Lead free construction
- Maintained inline
- Sizes: A129 – 1 ½”, 2”, 2 ½”, 3”, 4”, 6”  A729 – 3”, 4”, 6”
- Refer to Materials / Specification for additional information

**A129LF / A729LF**
- Same features same as A129 / A729
- Equipped with bypass flow regulator for extreme low flows

**ADDITIONAL FUNCTIONS AVAILABLE**
- Reverse flow check

**FIXTURE USAGE REFERENCE TABLE**

This guide is intended to illustrate water supply fixture units or flow demand of plumbing fixtures, common in residential and commercial building water systems. Consider that fixtures are never all used simultaneously when sizing your pilot operated PRV.

1 Fixture Unit = 1 GPM / 3.79 l/m

<table>
<thead>
<tr>
<th>FIXTURE TYPE</th>
<th>WATER SUPPLY FIXTURE UNITS (WSFU) PER MINUTE</th>
<th>WATER AVERAGE USE (estimate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bath Tub – ¾”</td>
<td>4 gal</td>
<td>35 gal</td>
</tr>
<tr>
<td>Dishwasher-residential</td>
<td>1.5 gal</td>
<td>10-20 gal</td>
</tr>
<tr>
<td>Drinking fountain</td>
<td>0.5</td>
<td>Volume based on time</td>
</tr>
<tr>
<td>Hose bib</td>
<td>2.5</td>
<td>Volume based on time</td>
</tr>
<tr>
<td>Lavatory</td>
<td>2.2 gal</td>
<td>1-2 gal</td>
</tr>
<tr>
<td>Clinic sink</td>
<td>3</td>
<td>Volume based on time</td>
</tr>
<tr>
<td>Kitchen sink</td>
<td>1.5</td>
<td>Volume based on time</td>
</tr>
<tr>
<td>Mop basin</td>
<td>1.5</td>
<td>Volume based on time</td>
</tr>
<tr>
<td>Shower head</td>
<td>2.5 gal</td>
<td>25-50 gal</td>
</tr>
<tr>
<td>Wash fountain- ¾”</td>
<td>4</td>
<td>Volume based on time</td>
</tr>
<tr>
<td>Toilet-gravity tank</td>
<td>2.5 gal</td>
<td>3-7 gal</td>
</tr>
<tr>
<td>Toilet-flushometer tank</td>
<td>1.6</td>
<td>Volume based on time</td>
</tr>
<tr>
<td>Washing Machine</td>
<td>18-40 gal / load</td>
<td></td>
</tr>
</tbody>
</table>

* Image demonstrates fixture usage and is not a recommendation for valve installation, sizing or building design.
Pressure Reducing Valves

**DISTRIBUTION SYSTEMS**

- Valves are located in municipal supply lines
- Demand may range from low to high
- High demand may be for fire flow
- Water usage varies relatively slowly over time

**SIZING GUIDELINES**
- Line sized valves are rarely necessary but are commonly specified
- When sizing valves for anticipated future demand, consider parallel PRV’s
- Refer to the Sizing Charts and contact your Apollo Representative for assistance.

**RECOMMENDED APOLLO MODELS**

**A127/A727**
- 2-way pilot controls valve in response to changes in demand
- Simple adjustment of outlet pressure
- Outlet pressure settings 20-200 psi
- Pilot system strainer, adjustable valve opening speed and isolation ball valves
- Inline maintenance
- Refer to Materials / Specification for additional information

**ADDITIONAL FUNCTIONS AVAILABLE**
- Back pressure sustaining
- Reverse flow check

**PROCESS SYSTEMS**

- Valves are located in any system where a process rapidly decreases a relatively high flow rate
- Demand may range from very low to high

**SIZING GUIDELINES**
- Line sized valves are rarely necessary but are commonly specified
- Refer to the Sizing Charts and contact your Apollo Representative for assistance.

**RECOMMENDED APOLLO MODELS**

**A127-5/A727-5**
- 2-way pilot controls valve outlet pressure in response to changes in demand
- Surge pilot minimizes downstream pressure buildup by quickly closing valve on rise in outlet pressure (loss of demand)
- Simple adjustment of outlet pressure and surge pressure settings
- Outlet pressure settings (spring ranges) 20-200, 100-300 psi
- Surge pressure setting typically 5-10 psi over outlet pressure setting
- Pilot system strainer, adjustable valve opening speed and isolation ball valves
- Inline Maintenance
- Refer to Materials / Specification for additional information

**ADDITIONAL FUNCTIONS AVAILABLE**
- Back pressure sustaining
- Solenoid shut off
- Reverse flow check

* Image demonstrates distribution usage and is not a recommendation for valve installation, sizing or system design.
Sizing pilot operated reducing valves is not a complicated process. It starts with determining requirements and following these guidelines in valve size selection. Sizing the PRV involves two factors: Pressure Drop or Differential and Flow Rate.

**STEP 1 –**
Determine the application type where the valve is being used. Refer to the comments “Sizing Guidelines” under the category selected on page 5 and 6.
- Commercial / Residential Buildings –
- Refer to the fixture usage table for examples of usage in these types of applications.
- Distribution System
- Process System

**STEP 2 –**
Determine the pressure differential – this is the difference between the inlet pressure (–) minus the outlet pressure.

**Example:**
- INLET 100 psi – OUTLET 50 psi (the pressure desired in the system) Difference = 50 psid
- INLET 80 psi – OUTLET 40 psi (the pressure desired to provide to the system) Difference = 40 psid

**STEP 3 –**
Determine the flow rate (range) that your system may require, Minimum and Maximum flows.

**STEP 4 –**
Select the valve size from the table on the next page that best fits the application conditions. Select the valve size that provides minimum and maximum flow ranges (min.-max.) for the pressure drop/differential that was calculated. The following types of PRV applications may apply.

### SINGLE VALVE

One valve can handle the minimum and maximum at the pressure drop/differential required.

**Example:** INLET 100 psi with 50 psi OUTLET pressure (differential 50 psi), flows from 25 gpm to 500 gpm. Line size is 4". Valve selection would be the reduced port 4". Outlet pressure would be constant 50 psi over the required flow range.

- 4" Full Port Valve 38-1000 gpm.
- 4" Reduced Port Valve (4" flanges x 3" internals) 29-630 gpm

### SINGLE VALVE WITH LOW-FLOW BYPASS

Valves can be equipped with a direct acting regulator or low flow bypass to regulate extremely low flows. This bypass regulator, mounted on the larger main valve, is set at a pressure of 5-10 psi higher than the main valve pilot. It reduces pressure under low flow conditions until the flow rate increases beyond its capacity and the outlet pressure drops. When pressure reaches the main valve pilot setting, it opens to provide pressure at the higher flows. The low-flow bypass configuration is typical for use in “building applications.”

- Direct acting low flow regulators have limited flow capacity. They are most effectively applied to valves sizes 6" x 4" and smaller.

### PARALLEL PRESSURE REDUCING VALVES

If one (1) valve is capable of handling the low flow requirements but not the high flow, then two parallel valves may be required. Similar to the low flow bypass, the smaller PRV controls the lower flow rates at a slightly higher pressure setting than the larger PRV. This PARALLEL configuration allows pressure control over a wide range of flows.

- To avoid a gap in flow ranges, select valves so the smaller valve high flow overlaps the larger valve low flow.

**Example:** INLET 80 psi with 40 psi OUTLET pressure (differential 40 psi) Flows from 10 gpm to 800 gpm.

**Selection options would be:**

<table>
<thead>
<tr>
<th>LOW FLOW</th>
<th>HIGH FLOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 1/2 flow range</td>
<td>5 gpm - 154 gpm</td>
</tr>
<tr>
<td>2&quot; flow range</td>
<td>9 gpm - 260 gpm</td>
</tr>
<tr>
<td>4&quot; flow range</td>
<td>38 gpm - 1000 gpm</td>
</tr>
<tr>
<td>6&quot; x 4&quot; flow range</td>
<td>41 gpm - 1100 gpm</td>
</tr>
</tbody>
</table>

**PARALLEL PRESSURE REDUCING VALVE APPLICATION**
Pressure Reducing Valve Sizing Guide

MINIMUM AND MAXIMUM FLOW RATES, GPM, VS. VALVE SIZE AND PRESSURE DIFFERENTIAL

How to use:
1.) Determine differential pressure: Inlet pressure minus outlet = differential

2.) Find the valve minimum and maximum flow rates per each size valve under the differential column.

Note: 3% OPEN MIN. FLOW / MAXIMUM FLOW BASED ON 90% OPEN OR 25 FT/SEC (which ever is lowest)

<table>
<thead>
<tr>
<th>VALVE SIZE</th>
<th>FLOW RATE IN GPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1/4&quot;</td>
<td></td>
</tr>
<tr>
<td>2-1/2&quot;</td>
<td></td>
</tr>
<tr>
<td>3&quot; (Reduced Port)</td>
<td></td>
</tr>
<tr>
<td>3&quot;</td>
<td></td>
</tr>
<tr>
<td>4&quot; (Reduced Port)</td>
<td></td>
</tr>
<tr>
<td>4&quot;</td>
<td></td>
</tr>
<tr>
<td>6&quot; (Reduced Port)</td>
<td></td>
</tr>
<tr>
<td>6&quot;</td>
<td></td>
</tr>
<tr>
<td>8&quot; (Reduced Port)</td>
<td></td>
</tr>
<tr>
<td>8&quot;</td>
<td></td>
</tr>
<tr>
<td>10&quot;</td>
<td></td>
</tr>
<tr>
<td>12&quot;</td>
<td></td>
</tr>
<tr>
<td>14&quot;</td>
<td></td>
</tr>
<tr>
<td>16&quot;</td>
<td></td>
</tr>
<tr>
<td>18&quot; (Reduced Port)</td>
<td></td>
</tr>
<tr>
<td>20&quot; (Reduced Port)</td>
<td></td>
</tr>
<tr>
<td>24&quot;</td>
<td></td>
</tr>
</tbody>
</table>

FLOW RATE IN GPM

<table>
<thead>
<tr>
<th>VALVE SIZE</th>
<th>DIFFERENTIAL PRESSURE, PSID</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>110</td>
</tr>
<tr>
<td>120</td>
<td>130</td>
</tr>
<tr>
<td>140</td>
<td>150</td>
</tr>
<tr>
<td>1-1/4&quot;</td>
<td>7-115</td>
</tr>
<tr>
<td>1-1/2&quot;</td>
<td>8-160</td>
</tr>
<tr>
<td>2&quot;</td>
<td>13-260</td>
</tr>
<tr>
<td>2-1/2&quot;</td>
<td>19-375</td>
</tr>
<tr>
<td>3&quot; (Reduced Port)</td>
<td>34-570</td>
</tr>
<tr>
<td>3&quot;</td>
<td>39-630</td>
</tr>
<tr>
<td>4&quot;</td>
<td>57-1000</td>
</tr>
<tr>
<td>6&quot; (Reduced Port)</td>
<td>61-1100</td>
</tr>
<tr>
<td>6&quot;</td>
<td>105-2250</td>
</tr>
<tr>
<td>8&quot; (Reduced Port)</td>
<td>137-2475</td>
</tr>
<tr>
<td>8&quot;</td>
<td>213-3900</td>
</tr>
<tr>
<td>10&quot;</td>
<td>342-6125</td>
</tr>
<tr>
<td>12&quot;</td>
<td>558-8800</td>
</tr>
<tr>
<td>14&quot;</td>
<td>626-10750</td>
</tr>
<tr>
<td>16&quot;</td>
<td>768-14225</td>
</tr>
<tr>
<td>18&quot; (Reduced Port)</td>
<td>854-14225</td>
</tr>
<tr>
<td>20&quot; (Reduced Port)</td>
<td>939-14225</td>
</tr>
<tr>
<td>24&quot;</td>
<td>1964-31500</td>
</tr>
</tbody>
</table>

for additional information, submittal sheets and manuals, visit www.apollovalves.com
**Pressure Reducing Valve**

**129FC SERIES**

The Model 129FC automatically reduces high pressure in building riser pipe to a pressure that can be easily handled by the fire protection components it supplies.

**FEATURES:**
- Maintains constant discharge pressure despite variations in demand or inlet pressure.
- Eliminates pressure fall off.
- Easily adjusted for discharge pressure ranging from 50-165 psi.
- Easily cleaned, repaired and adjusted without removal from the line.
- Underwriters Laboratories listed, Control Number 18S5 (manufactured by OCV Control Valves)
- UL / ULC Listed for pressure control service in sizes 1.5” - 8”, globe or angle configuration. (manufactured by OCV Control Valves)
- Horizontal or vertical mounting in all sizes.
- ANSI Flanged Class 150 or Class 300.
- Grooved end flanges available on 1.5” - 6”.
- Screwed end flanges available on 1.5”, 2”, 2.5” and 3”.
* See Specifications sheet for options

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**Fire Pump Relief Valve**

**108FC SERIES**

The Model 108FC automatically relieves excess fire pump discharge pressure, to prevent the pressure from exceeding the rating of the fire system components.

**FEATURES:**
- Limits maximum pump discharge pressure.
- Adjustable 60-180 psi or 100-300 psi.
- Factory tested and pre-set to your requirements.
- UL Listed & Factory Mutual Approved for both split-case centrifugal and vertical turbine pumps. (manufactured by OCV Control Valves)
- Sizes 3” - 8”, globe and angle pattern.
- ANSI Flanged Class 150, Class 300, and 300 inlet x 150 outlet.
* See Specifications sheet for options

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**Thermal Expansion Pressure Relief Valve**

**1330FC SERIES**

The model 1330FC is a two-way, normally closed valve, that senses pressure under its diaphragm and balances it against an adjustable spring load. An increase in pressure above the spring set point tends to make the valve open.

**FEATURES:**
- UL Listed. (manufactured by OCV Control Valves)
- 1330FC meets the NFPA 13 requirement for an approved thermal expansion relief valve to be installed downstream of all pressure reducing valves in all sprinkler systems.
- Field adjustable spring range 60-175 psi for accurate control.
- Local sense line (self-contained sense loop).
- All parts replaceable while valve is installed.
- Bronze, stainless steel or nickel aluminum bronze construction.
* See Specifications sheet for options

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**Pump Suction Control Valve**

**108FPS SERIES**

The model 108FPS is used to prevent the fire pump from outdrawing the available supply. In so doing, it protects the pump suction supply from damage associated with a pressure that is too low or backflow and assures adequate supply pressure to the fire system components.

**FEATURES:**
- Maintains minimum pump suction pressure.
- Installs on fire pump discharge; senses pump suction.
- Suction pressure is adjustable with single screw.
- Adjustable 5-30 psi range.
- Sizes 3” - 8”, globe and angle.
- Pilot-operated main valve.
- Maintain without removal from the line.
- Adjustable opening speed.
- Factory tested and can be pre-set to your requirements.
- Factory Mutual Approved. (manufactured by OCV Control Valves)
* See Specifications sheet for options
In many liquid piping systems, it is vital that line pressure is maintained within relatively narrow limits. This is the function of the A108 Pressure Relief/Back Pressure Series of the Apollo control valves. Installed in the main flow line, the standard Model A108 acts as a back pressure or pressure sustaining valve. In this configuration, the valve maintains a constant upstream pressure regardless of fluctuating downstream demand. When used in a bypass line, the same model will function as a relief valve, protecting the system against potentially damaging surges.

**Features:**
- Relief: Maintains a constant inlet pressure by relieving excess high pressure.
- Sustaining: Prevents pressure from dropping below a minimum.
- Inlet pressure is accurate over a wide range of flow.
- Inlet pressure is adjustable with a complete range of control springs.
- Quick opening with controlled closing.
- Isolation ball valves to facilitate maintenance and troubleshooting.
- Spring ranges (inlet setting): 5-30 psi, 20-80 psi, 20-200 standard psi, and 100-300 psi.
- High pressure model A108-2HP spring ranges (inlet setting): 200-750 psi.

*See specifications sheet for material options.*

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The Apollo Series A115 Solenoid Control Valve is designed to provide on/off or open/close control of fluids in response to an electrical signal. The valve consists of the basic Apollo model A65 with solenoid-operated pilot. With the appropriate solenoid, the valve may be normally closed (energize to open) or normally open (energize to close).

**Features:**
- The A115 Series provides responsive control in answer to such triggering devices as clocks, timers, relays, probes, pressure or temperature sensors.
- Available for AC or DC voltages.
- Wider range of sizes and flow capacity than is available with direct-acting solenoid valves.
- Valves can be equipped with Manual Override solenoid operation.
- Solenoid feature can be added to other hydraulic control functions.
- Isolation ball valves to facilitate maintenance and troubleshooting.

*See specifications sheet for material options.*

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The Apollo A110 Series Differential Control Valve is designed to accurately control the pressure difference between any two points. In some systems this means the valve remains closed until pressure differential commands its opening. It is a pilot operated, modulating type valve which controls pressure accurately and consistently at the desired setting.

**Features:**
- Opens on increasing differential.
- Dual pilot sense lines can be valve or remote connected.
- Differential is adjustable over complete range of control springs.
- Isolation ball valves to facilitate maintenance and troubleshooting.
- Spring ranges (outlet setting): 5-30 psid, 20-80 psid, 20-200 psid, and 100-300 psid.

*See specifications sheet for material options.*
Rate of Flow

**A120 SERIES**

The Apollo Series A120 Rate of Flow control valve is designed to control or limit flow to a predetermined rate, regardless of fluctuations in downstream or upstream pressure.

**FEATURES:**
- Self contained, including the differential sensing orifice plate and pilot.
- Flow rate is field adjustable (within orifice bore range).
- Extra sensitive differential pilot specifically designed for rate of flow application.
- Works equally well on all types of clean, nonabrasive liquids.
- Isolation ball valves to facilitate maintenance and troubleshooting.

* See specifications sheet for material options.

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Float Control

**A800 SERIES**

The Apollo Series A800 Float Control Valves are designed to maintain a desired level in a tank or reservoir by opening for filling the tank when fluid is below the high level point and closing tightly when the desired level is reached.

**FEATURES:**
- The A800 is a non-modulating valve; either full open or full closed. It is available in two basic configurations:
  1. Model A800, with the float pilot provided separate from the main valve for remote mounting. This configuration is used when the fill line is located at the bottom of the tank.
  2. Model A800VM, with the float pilot mounted on the main valve. This configuration is typically used when the fill line is located at the top of the tank.
- All Series A800 valves include an Apollo Model A65 Basic Valve assembly and a Model A814 three-way rotary float pilot. For faster operation, valves 8" and larger also include a three-way auxiliary pilot.
- Isolation ball valves to facilitate maintenance and troubleshooting.

* See specifications sheet for material options.

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Diaphragm Check

**A94 SERIES**

The Apollo Series A94 Check Valve is a simple on-off valve that opens to allow forward flow when inlet pressure exceeds outlet and closes tightly to prevent backflow when outlet pressure exceeds inlet pressure.

**FEATURES:**
- Non-surge opening and/or closing when equipped with adjustable opening and/or closing speed controls.
- Equipped with valve position indicator on all models.
- Isolation ball valves to facilitate maintenance and troubleshooting.

* See specifications sheet for material options.
Digital Electronic Valve

With the development and proliferation of high level SCADA systems comes the need for automatic control valves to interface with such systems. The Apollo Series A22 Digital Electronic Control Valves were specifically designed for this task. While retaining the advantages of simplicity and operation from line pressure, these valves offer a level of ease of operation and degree of control not previously achieved.

FEATURES:
- Can be used as part of a SCADA system, or as a “stand alone.”
- Extreme stability over a wide range of flows.
- Useful when set points must be changed frequently.
- Can be used to control almost any process variable.
- Hydraulic pilot backup available.
- Can be configured to accept all common process signals (4-20 mA, 0-5 volt, etc).
- Can be configured for low head pressure applications.
- Simple valve sizing.
- Isolation ball valves to facilitate maintenance and troubleshooting.

* See specifications sheet for material options.

** PRESSURE TRANSDUCER, FLOW METER, LEVEL TRANSMITTER, THERMOCOUPLE OR RTD
NOTE: All waterworks valves meet the Low-Lead laws of the United States, including individual state laws, as of March 2014. NSF 372

<table>
<thead>
<tr>
<th>VALVE BODY &amp; BONNET</th>
<th>DUCTILE IRON</th>
<th>CAST STEEL</th>
<th>CAST BRONZE</th>
<th>STAINLESS STEEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material Specifications</td>
<td>ASTM A536/65-45-12 (epoxy coated)</td>
<td>ASTM A216/WCB (epoxy coated)</td>
<td>ASTM B61</td>
<td>ASTM A743/CF8M</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>END CONNECTIONS</th>
<th>ANSI B16.42</th>
<th>ANSI B16.5</th>
<th>ANSI B16.24</th>
<th>ANSI B16.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flange Standard (also available in metric)</td>
<td>150 #</td>
<td>300 #</td>
<td>150 #</td>
<td>300 #</td>
</tr>
<tr>
<td>Flange Class</td>
<td>150 #</td>
<td>300 #</td>
<td>150 #</td>
<td>300 #</td>
</tr>
<tr>
<td>Flange Face</td>
<td>Flat</td>
<td>Raised</td>
<td>Raised</td>
<td>Flat</td>
</tr>
<tr>
<td>Maximum Working Pressure</td>
<td>250 psi</td>
<td>640 psi</td>
<td>285 psi</td>
<td>740 psi</td>
</tr>
<tr>
<td>Screwed Working Pressure</td>
<td>ANSI B1.20.1 (B2.1) 640 psi (Bronze 500 psi)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Grooved End Working Pressure | 300 psi |

| Internals | Stainless Steel AISI 303 | Optional Monel |
| Spring | Stainless Steel AISI 302 |
| Spool | Ductile Iron ASTM A536 (epoxy coated) | Bronze, Stainless Steel |
| Seat Disc Retainer | Ductile Iron ASTM A536 (epoxy coated) 4" & smaller valves - Stainless Steel |
| Diaphragm Plate | Ductile Iron ASTM A536 (epoxy coated) | Bronze, Stainless Steel |
| Seat Ring (Trim) | Bronze ASTM B884-C8936 Optional Stainless Steel ASTM A743/CF8M |
| Upper Stem Bushing | Standard Bronze ASTM B438 |
| Lower Stem Bushing | Seat Material Valves w/Stainless Steel Seat Ring - Teflon |

| Elastomer Parts (Rubber) | Standard - BUNA-N Nylon Reinforced | Optional - Viton* |
| Operating Temperature | -40°F to 180°F | 32°F to 400°F |

| Coatings | Wide range of coating per your fluid application. Coatings handle municipal potable water, seawater, petroleum and refined products |

| Electrical Solenoids | Bodies | Standard Brass | Stainless Steel (Optional) |
| Enclosures | Water tight, NEMA 1, 3, 4, & 4X |
| Power | AC, 60Hz-24, 120, 240, 480 volts |
| Operation | Energize to open (normally closed) De-energize to open (normally open) |

| Control Pilots | Bodies | Low-Head Bronze | Stainless Steel ASTM A743/CF8M |
| Internal | Stainless Steel |
| Tubing | Copper |
| Fittings | Low-Head Brass |

| Saltwater Service Valve Materials | Cast Steel Special Coatings – Ni Aluminum Bronze ASTM B148 – Super Duplex Stainless Steel |

<table>
<thead>
<tr>
<th>Globe Flanged Sizes</th>
<th>1.25&quot;</th>
<th>1.5&quot;</th>
<th>2&quot;</th>
<th>2.5&quot;</th>
<th>3&quot;</th>
<th>4&quot;</th>
<th>6&quot;</th>
<th>8&quot;</th>
<th>10&quot;</th>
<th>12&quot;</th>
<th>14&quot;</th>
<th>16&quot;</th>
<th>18&quot;*</th>
<th>20&quot;*</th>
<th>24&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sizes</td>
<td>32mm</td>
<td>40mm</td>
<td>50mm</td>
<td>65mm</td>
<td>80mm</td>
<td>100mm</td>
<td>150mm</td>
<td>200mm</td>
<td>250mm</td>
<td>300mm</td>
<td>350mm</td>
<td>400mm</td>
<td>450mm*</td>
<td>500mm*</td>
<td>600mm</td>
</tr>
</tbody>
</table>

* Consult Factory

<table>
<thead>
<tr>
<th>Globe Flanged Sizes - Flange X Port (Reduced Port)</th>
<th>3x2&quot;</th>
<th>4x3&quot;</th>
<th>6x4&quot;</th>
<th>8x6&quot;</th>
<th>10x8&quot;*</th>
<th>12x10&quot;*</th>
<th>16x12&quot;*</th>
<th>18x16&quot;</th>
<th>20x16&quot;</th>
<th>24x16&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sizes</td>
<td>80x50mm</td>
<td>100x80mm</td>
<td>150x100mm</td>
<td>200x150mm</td>
<td>250x200mm</td>
<td>300x250mm</td>
<td>400x300mm</td>
<td>450x400mm</td>
<td>500x400mm</td>
<td>600x400mm</td>
</tr>
</tbody>
</table>

* Consult Factory

<table>
<thead>
<tr>
<th>Angle Flanged Sizes</th>
<th>1.25&quot;</th>
<th>1.5&quot;</th>
<th>2&quot;</th>
<th>2.5&quot;</th>
<th>3&quot;</th>
<th>4&quot;</th>
<th>6&quot;</th>
<th>8&quot;</th>
<th>10&quot;</th>
<th>12&quot;</th>
<th>16&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sizes</td>
<td>32mm</td>
<td>40mm</td>
<td>50mm</td>
<td>65mm</td>
<td>80mm</td>
<td>100mm</td>
<td>150mm</td>
<td>200mm</td>
<td>250mm</td>
<td>300mm</td>
<td>400mm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Globe/Angle Screwed Sizes</th>
<th>1.25&quot;</th>
<th>1.5&quot;</th>
<th>2&quot;</th>
<th>2.5&quot;</th>
<th>3&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sizes</td>
<td>32mm</td>
<td>40mm</td>
<td>50mm</td>
<td>65mm</td>
<td>80mm</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Globe/Angle Grooved Sizes</th>
<th>1.5&quot;</th>
<th>2&quot;</th>
<th>2.5&quot;</th>
<th>3&quot;</th>
<th>4&quot;</th>
<th>6&quot;*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sizes</td>
<td>32mm</td>
<td>50mm</td>
<td>65mm</td>
<td>80mm</td>
<td>100mm</td>
<td>150mm*</td>
</tr>
</tbody>
</table>

* Globe only
For maximum efficiency, the control valve should be mounted in a piping system so that the valve bonnet (cover) is in the top position. Other positions are acceptable but may not allow the valve to function to its fullest and safest potential. In particular please consult the factory before installing 8" and larger valves, or any valves with a limit switch, in positions other than described. Space should be taken into consideration when mounting valves and their pilot systems.

A routine inspection and maintenance program should be established and conducted yearly by a qualified technician.
Valve Flow Characteristics

General flow characteristics for on/off valve sizes are listed below. DO NOT use this data to size modulating valves. Refer to earlier sizing information in this brochure for sizing valves.

FLOW CHARACTERISTICS:

<table>
<thead>
<tr>
<th>Valve Size</th>
<th>US 1-1/4&quot;</th>
<th>1-1/2&quot;</th>
<th>2&quot;</th>
<th>2-1/2&quot;</th>
<th>3&quot;</th>
<th>4&quot;</th>
<th>6&quot;</th>
<th>8&quot;</th>
<th>10&quot;</th>
<th>12&quot;</th>
<th>14&quot;</th>
<th>16&quot;</th>
<th>24&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metric</td>
<td>DN32</td>
<td>DN40</td>
<td>DN50</td>
<td>DN65</td>
<td>DN80</td>
<td>DN100</td>
<td>DN150</td>
<td>DN200</td>
<td>DN250</td>
<td>DN300</td>
<td>DN350</td>
<td>DN400</td>
<td>DN600</td>
</tr>
<tr>
<td>Globe Cv</td>
<td>23</td>
<td>27</td>
<td>47</td>
<td>68</td>
<td>120</td>
<td>200</td>
<td>450</td>
<td>760</td>
<td>1250</td>
<td>1940</td>
<td>2200</td>
<td>2850</td>
<td>6900</td>
</tr>
<tr>
<td>Metric</td>
<td>5.5</td>
<td>6.5</td>
<td>11.3</td>
<td>16.3</td>
<td>28.7</td>
<td>47.9</td>
<td>108</td>
<td>182</td>
<td>299</td>
<td>465</td>
<td>527</td>
<td>683</td>
<td>1653</td>
</tr>
<tr>
<td>Angle Cv</td>
<td>30</td>
<td>35</td>
<td>65</td>
<td>87</td>
<td>160</td>
<td>270</td>
<td>550</td>
<td>1000</td>
<td>1600</td>
<td>2400</td>
<td>--</td>
<td>4000</td>
<td>--</td>
</tr>
<tr>
<td>Metric</td>
<td>7.2</td>
<td>8.4</td>
<td>15.6</td>
<td>20.8</td>
<td>38.3</td>
<td>64.7</td>
<td>132</td>
<td>240</td>
<td>383</td>
<td>575</td>
<td>--</td>
<td>958</td>
<td>--</td>
</tr>
</tbody>
</table>

\[DP = sg\left(\frac{Q}{C_v}\right)^2\]

where:
- Q = Flow Rate in USGPM (U.S.) or Q = Flow Rate in liters/sec (Metric)
- Cv = Flow Rate in USGPM @ 1 psi pressure drop (U.S.) or Cv = Flow Rate in liter/sec @ 1 bar pressure drop (Metric)
- DP = Pressure drop in psi (U.S.) or DP = Pressure drop in bar (Metric)
- sg = specific gravity of line fluid

Reduced Port Valve Flow Characteristics

General flow characteristics for on/off valve sizes are listed below. DO NOT use this data to size modulating valves. Refer to earlier sizing information in this brochure for sizing valves.

FLOW CHARACTERISTICS:

<table>
<thead>
<tr>
<th>Flange Size (inches)</th>
<th>3&quot;</th>
<th>4&quot;</th>
<th>6&quot;</th>
<th>8&quot;</th>
<th>10&quot;*</th>
<th>12&quot;*</th>
<th>16&quot;*</th>
<th>18&quot;</th>
<th>20&quot;</th>
<th>24&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interior Port (inches)</td>
<td>2&quot;</td>
<td>3&quot;</td>
<td>4&quot;</td>
<td>6&quot;</td>
<td>8&quot;</td>
<td>10&quot;</td>
<td>12&quot;</td>
<td>16&quot;</td>
<td>16&quot;</td>
<td>16&quot;</td>
</tr>
<tr>
<td>Flange Size (Metric)</td>
<td>DN80</td>
<td>DN100</td>
<td>DN150</td>
<td>DN200</td>
<td>DN250</td>
<td>DN300</td>
<td>DN400</td>
<td>DN450</td>
<td>DN500</td>
<td>DN600</td>
</tr>
<tr>
<td>Interior Port (Metric)</td>
<td>50</td>
<td>80</td>
<td>100</td>
<td>150</td>
<td>200</td>
<td>250</td>
<td>300</td>
<td>400</td>
<td>400</td>
<td>400</td>
</tr>
<tr>
<td>Cv (US Gal @ 1 PSID)</td>
<td>70</td>
<td>135</td>
<td>215</td>
<td>480</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>3000</td>
<td>3300</td>
<td>3600</td>
</tr>
<tr>
<td>Cv (L/Sec @ 1 bar)</td>
<td>16.7</td>
<td>32.3</td>
<td>51.4</td>
<td>114.7</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>717</td>
<td>789</td>
<td>860</td>
</tr>
</tbody>
</table>

\[DP = sg\left(\frac{Q}{C_v}\right)^2\]

where:
- Q = Flow Rate in USGPM (U.S.) or Q = Flow Rate in liters/sec (Metric)
- Cv = Flow Rate in USGPM @ 1 psi pressure drop (U.S.) or Cv = Flow Rate in liter/sec @ 1 bar pressure drop (Metric)
- DP = Pressure drop in psi (U.S.) or DP = Pressure drop in bar (Metric)
- sg = specific gravity of line fluid

* consult factory