

**PERFORMANCE SPECIFICATIONS**

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**PIC-V® Valve**

1. PRESSURE INDEPENDENT ACTUATED BALL VALVES AND CARTRIDGE (PIC-V)
  - 1.1. The modulating control valves shall be pressure independent and shall include a Pressure Compensating Cartridge, Actuated Ball Valve, and Manual Isolation Ball in a single valve housing.
  - 1.2. Valve housing shall consist of forged brass, rated at no less than 360 psi at 250°F.
  - 1.3. Valve shall have a fixed end or union end connection with factory installed air vent to allow for venting of the coil or heat pump.
  - 1.4. Dual pressure/temperature test valves for verifying the pressure differential across the cartridge and flow limiting ball shall be standard. Valves without pressure/temperature test valves shall not be allowed. Valves that require additional pressure/temperature test valves to be installed shall not be allowed.
  - 1.5. A flow tag shall be furnished with each valve.
  - 1.6. A flow chart shall be furnished that provides flow rate at reduced load positions for commissioning as well as programming into the Building Management System for flow and/or energy management purposes.
  - 1.7. Balancing valves shall not be required where pressure-independent valves are installed.
2. PRESSURE COMPENSATING CARTRIDGE (PCC)
  - 2.1. PCC shall automatically compensate for pressure changes in valve and shall maintain a constant pressure drop across the flow limiting actuated ball.
  - 2.2. Valve internal control mechanism includes a diaphragm and full travel linear coil stainless steel spring.
  - 2.3. Valves shall include an accessible/ replaceable cartridge.
3. ACTUATED BALL VALVE
  - 3.1. Valve ball shall consist of chemically plated nickel brass or stainless steel.

- 3.2. Stem shall be removable/replaceable without removing valve from line and shall include both teflon seals and EPDM O-ring.
  - 3.3. Actuated ball shall include a shut off to provide bubble tight close off when actuated ball is closed. Pressure Independent valves that allow ANSI Class 4 leakage or higher shall not be accepted.
  - 3.4. Manufacturer shall be able to provide ball insert to limit flow to maximum flow rate with  $\pm 5\%$  accuracy. Accuracy over  $\pm 5\%$  shall not be accepted.
  - 3.5. Actuated ball shall accurately control the flow from 0 to 100% full flow using the entire 90 degrees of actuator rotation. Valves that use less than 90 degrees of the actuator stroke shall not be accepted.
  - 3.6. Valve shall have EPDM O-rings behind the seals to allow for a minimum close-off pressure of 100 psi with 35 in-lbs of torque for 1/2" – 3" sizes.
  - 3.7. The actuator and plate can be rotated after mounting.
  - 3.8. A universal mounting plate shall allow installation of actuators meeting the system electrical requirements and valve torque requirements as provided by Belimo, Honeywell, Schneider Electric, Johnson Controls, KMC, Neptronics, or Siemens. The control valve actuator may be furnished by the controls contractor under Section 15970 or by the Pressure Independent Control Valve manufacturer.
4. ISOLATION BALL VALVE
- 4.1. Valve shall include a 600 WOG manual isolation ball valve.
  - 4.2. Stem shall be removable/replaceable without removing valve from line and shall include both teflon seals and EPDM O-ring.

**Unimizer® (1/2" to 3")****1. ACTUATED BALL VALVE**

- 1.1. Valve housing shall consist of forged brass CuZn39Pb2 rated at no less than 360 psi at 250°F.
- 1.2. Manufacturer shall be able to provide glass-filled polymer ball insert to make flow control equal percentage.
- 1.3. Valve ball shall consist of chemically nickel-plated brass. 2-Way Valve: Manufacturer shall be able to provide optional SS ball and stem.
- 1.4. 2-Way Valve: Valve shall have EPDM O-Rings behind ball seals to allow for a minimum close-off pressure of 100 psi with 35 in-lbs of torque for 1/2" - 2" sizes. 3-Way Valve: 40 psi with 35 in-lbs of torque.
- 1.5. 2-Way Valve: Valve shall be available with a minimum of 25 unique Cv values. 3-Way Valve: Bypass Cv shall be 80% of Through Cv.
- 1.6. Stem shall be removable/replaceable without removing valve from line and shall include both teflon seals and EPDM O-ring.

1.7. 3-Way Valve: Valves shall be installed in Tee configuration with actuator perpendicular to shaft. Valve shall not require elbows of any kind.

## 2. VALVE ACTUATOR

2.1. Control valve actuator shall be analog modulating (4-20 mA or 2-10 V), floating (tri-state), Pulse Width Modulation, or two position as indicated in the control sequence.

2.2. Actuator shall provide minimum torque required for full valve shutoff position.

2.3. A 3 foot cable shall be provided for installation to electrical junction box.

2.4. A universal mounting plate shall allow installation of actuators meeting the system electrical requirements and valve torque requirements as provided by Belimo, Honeywell, Schneider Electric, Johnson Controls, KMC, Nepontronics, or Siemens. The control valve actuator may be furnished by the controls contractor under Section 15970 or by the Valve manufacturer.

## 3. ACCESSORIES

3.1. Identification tags shall be available for all valves; tags shall be indelibly marked with Cv, model number and location; tags shall be 3" x 3" aluminum.

### **Unimizer® (4" to 6")**

#### 1. ACTUATED BALL VALVE

1.1. Valve housing shall consist of cast iron ASTM A395, 60-40-18 rated at no less than 240 psi at 250°F. Valve housing shall have ANSI Class 125 flanges.

1.2. Valve ball shall consist of stainless steel with parabolic ports to make flow control equal percentage.

1.3. Valve shall have a blow-out proof stem with two EPDM O-Rings.

1.4. Valve shall have EPDM O-Rings behind ball seals to allow for a minimum close-off pressure of 70 psi with 88 in-lbs of torque for 4" and 5" valves. 6" valves shall require actuators with 140 in-lbs of torque for flowrates under 700 gpm.

1.5. Valve shall be available with a minimum of 5 unique Cv values for each size. 3-Way Valve: Bypass Cv shall be 80% of Through Cv.

#### 2. VALVE ACTUATOR

2.1. Control valve actuator shall be analog modulating (4-20 mA or 2-10 V), floating (tri-state), Pulse Width Modulation, or two position as indicated in the control sequence.

2.2. Actuator shall provide minimum torque required for full valve shutoff position.

2.3. A 3 foot cable shall be provided for installation to electrical junction box.

2.4. A universal mounting plate shall allow installation of actuators meeting the system electrical requirements and valve torque requirements as provided by Belimo, Honeywell, Schneider Electric, Johnson Controls, KMC, Nepontronics, or Siemens. The control valve actuator may be furnished by the controls contractor under Section 15970 or by the Valve manufacturer.

**3. ACCESSORIES**

- 3.1. Identification tags shall be available for all valves; tags shall be indelibly marked with Cv, model number and location; tags shall be 3" x 3" aluminum.

**Automizer®****1. INTEGRAL CONTROL / FLOW RATE LIMITING VALVE**

- 1.1. Valve shall consist of a dynamic flow limiting device, an integral, electrically actuated two-way control valve, and manual isolation ball valve.

**2. ACTUATED BALL VALVE**

- 2.1. Valve housing shall consist of forged brass CuZn39Pb2, rated at no less than 360 psi at 250°F.
- 2.2. Manufacturer shall be able to provide glass-filled polymer ball insert to make flow control equal percentage.
- 2.3. Valve ball shall consist of chemically plated nickel brass.
- 2.4. Stem shall be removable/replaceable without removing valve from line and shall include both teflon seals and EPDM O-ring.
- 2.5. Valve shall have EPDM O-Rings behind ball seals to allow for a minimum close-off pressure of 100 psi with 35 in-lbs of torque for 1/2" to 1-1/2" sizes.
- 2.6. Valve shall be available with a minimum of 30 unique Cv values.
- 2.7. Valve shall be available with fixed end female or fixed end sweat connections.

**3. FLOW LIMITING VALVE**

- 3.1. Flow regulation cartridge assembly shall be precision ground, all AISI 300 series stainless steel; shall be available in four PSID control ranges; minimum range shall be capable of being actuated by less than 1.5 PSID; and shall be capable of controlling flow to within ±5% of rated flow.
- 3.2. Flow regulation unit shall be readily accessible, for changeout or maintenance.

**4. VALVE ACTUATOR**

- 4.1. Control valve actuator shall be analog modulating (4-10 mA or 2-10 V), floating (tri-state), Pulse Width Modulation, or two position as indicated in control sequence.
- 4.2. Actuator shall provide minimum torque required for full valve shutoff position.
- 4.3. A 3 foot cable shall be provided for installation to electrical junction box.
- 4.4. A universal mounting plate shall allow installation of actuators meeting the system electrical requirements and valve torque requirements as provided by Belimo, Honeywell, Schneider Electric, Johnson Controls, KMC, Neptronics, or Siemens. The control valve actuator may be furnished by the controls contractor under Section 15970 or by the Valve manufacturer.

**5. ACCESSORIES**

5.1. Identification tags shall be available for all valves; tags shall be indelibly marked with Cv, model number, location; tags shall be 3" x 3" aluminum.

**MVP® Valve**

1. PRESSURE INDEPENDENT DYNAMIC FLOW CONTROL VALVE
  - 1.1. Dynamic control valve shall accurately control flow, independent of system pressure fluctuation.
  - 1.2. Contactor shall install dynamic flow control valves where indicated in drawings.
  - 1.3. Valve shall be electronic, dynamic, modulating 2-way control device
  - 1.4. Maximum flow setting shall be adjustable to 55 different settings within the range of the valve size by changing the actuator programming.
  - 1.5. Balancing valves shall not be required where pressure-independent valves are installed.
2. VALVE ACTUATOR
  - 2.1. Valve actuator housing shall be rated to IP44 insulation.
  - 2.2. Actuator shall be driven by a 24Vdc motor, and shall accept 2-10 Vdc, 4-20mA, 3-point floating or pulse width modulation electric signal and shall include resistor to facilitate any of these signals.
  - 2.3. Actuator shall be capable of providing 4-20mA or 2-10 Vdc feedback signal to the control system.
  - 2.4. External LED readout of current valve position and maximum valve position setting shall be standard.
  - 2.5. Optional fail safe system to power valve to either open or closed position from any position in case of power failure shall be available.
3. VALVE HOUSING
  - 3.1. Housing shall be constructed of Ductile Iron ASTM A536-65T, Class 60-45-18 rated at no less than 580 psi static pressure and 248°C.
4. FLOW REGULATION UNIT
  - 4.1. Flow regulation unit shall consist of 304 Stainless Steel and hydrogenated acrylonitrile butadiene rubber (1/2"–1-1/2") or 316 Stainless Steel and EPDM (2"–6").
  - 4.2. Flow regulation unit shall be accessible for maintenance.
  - 4.3. Dual pressure/temperature test valves for verifying accuracy of flow performance shall be available for all valve sizes.

**Streamline Control**

1. INTEGRAL CONTROL / FLOW RATE LIMITING VALVE

- 1.1. Valve shall consist of a dynamic flow limiting device, an integral and electrically actuated two-way control valve.
2. ACTUATED VALVE
  - 2.1. Valve housing shall consist of forged brass CuZn39Pb2, rated at no less than 400 psi at 200°F. Certified lead free brass for domestic water applications is optional.
  - 2.2. Valve shall control flow with a ceramic disc capable of closing off against 250 PSID.
  - 2.3. Ceramic disc shall have ports to provide equal percent control of flow.
  - 2.4. Step motor to control ceramic disc shall be built directly into the valve housing.
  - 2.5. Valve Cv shall be electrically adjustable via dip switches on control board. (Optional)
  - 2.6. Valve shall be available with FNPT or sweat connections.
  - 2.7. Valve shall be water resistant for installation in wet applications.
3. FLOW LIMITING VALVE
  - 3.1. Flow regulation cartridge assembly shall be precision ground, all AISI 300 series stainless steel; shall be available in four PSID control ranges; minimum range shall be capable of being actuated by less than 1.5 PSID; and shall be capable of controlling flow to within  $\pm 5\%$  of rated flow.
4. VALVE ACTUATOR (CONTROL BOARD)
  - 4.1. Control board shall be analog modulating (2-10V), On/Off, or 3-point floating (tri-state), selectable in field via dip switches on the board.
  - 4.2. Control board cycle time shall be 50-60 seconds.
  - 4.3. Control board shall be compatible with 22-35 Vac/Vdc.
  - 4.4. Control board shall be capable of remote mounting.
  - 4.5. Control board shall include color coded LED lights to indicate valve operation and simplify troubleshooting (Optional)
  - 4.6. Valve comes with 15" wire lead.

**Streamline Zone**

1. ACTUATED VALVE
  - 1.1. Valve housing shall consist of forged brass CuZn39Pb2, rated at no less than 400 psi at 200°F. Certified lead free brass for domestic water applications is optional.
  - 1.2. Valve shall control flow with a ceramic disc capable of closing off against 250 PSID.
  - 1.3. Ceramic disc shall have ports to provide equal percent control of flow.
  - 1.4. Step motor to control ceramic disc shall be built directly into the valve housing.
  - 1.5. Valve Cv shall be electrically adjustable via dip switches on control board. (Optional)
  - 1.6. Valve shall be available with FNPT or sweat connections.

- 1.7. Valve shall be water resistant for installation in wet applications.
2. VALVE ACTUATOR (CONTROL BOARD)
  - 2.1. Control board shall be analog modulating (2-10V), On/Off, or 3-point floating (tri-state), selectable in field via dip switches on the board.
  - 2.2. Control board cycle time shall be 50-60 seconds.
  - 2.3. Control board shall be compatible with 22-35 Vac/Vdc.
  - 2.4. Control board shall be capable of remote mounting.
  - 2.5. Control board shall include color coded LED lights to indicate valve operation and simplify troubleshooting. (Optional)
  - 2.6. Valve comes with 15" wire lead.

**PINNACLE Valve**

1. PRESSURE INDEPENDENT DYNAMIC FLOW CONTROL VALVE
  - 1.1. The modulating control valves shall be pressure independent and shall include a Pressure Compensating Cartridge and Actuated Valve in a single valve housing.
  - 1.2. Maximum flow setting shall be adjustable to 41 different settings within the range of the valve size.
  - 1.3. Balancing valves shall not be required where pressure-independent valves are installed.
2. VALVE ACTUATOR
  - 2.1. FT actuators
    - 2.1.1. Valve actuator housing shall be rated to IP54, including up-side-down mounting.
    - 2.1.2. Actuator shall be driven by 24V or 230V AC, and shall depending on actuator choice accept 0-10V DC or ON/OFF control signal.
    - 2.1.3. Actuator shall use full stroke and provide full authority.
    - 2.1.4. Actuator shall have visible indication of stroke position.
    - 2.1.5. Failsafe function shall be available on all version.
  - 2.2. OR... FN actuators
    - 2.2.1. Valve actuator housing shall be rated to IP54.
    - 2.2.2. Actuator shall be driven by 24V AC/DC or 110V/230V AC, and shall depending on actuator choice accept 0(2)-10V DC, 3-point floating or 2-position control signal.
    - 2.2.3. Actuator shall use full stroke and provide full authority.
    - 2.2.4. Actuator shall have visible indication of stroke position.

2.2.5. Feedback signal 0(2)-10V DC to the control system shall be standard on modulating version.

2.2.6. Optional failsafe function shall be available on 24V AC/DC versions.

2.2.7. Optional auto stroke function shall be available on modulating version.

2.2.8. Manual override shall be possible without use of tools.

### 3. VALVE HOUSING

#### 3.1. A style

3.1.1. Valve housing shall consist of forged brass ASTM CuZn40Pb2, rated at no less than 360 psi static pressure at +248°F.

#### 3.2. OR AB style

3.2.1. Valve housing shall consist of forged brass ASTM CuZn40Pb2, rated at no less than 360 psi static pressure at +248°F.

3.2.2. Pressure/temperature test plugs for verifying accuracy of flow performance shall be available for all valve sizes.

### 4. FLOW REGULATION UNIT

4.1. Flow regulation unit shall consist of glass-reinforced PSU/POM/PPS with an EPDM diaphragm (3/4" insert) or a hydrogenated acrylonitrile-butadiene-rubber diaphragm (1 1/2" insert).

4.2. Flow regulation unit shall be readily accessible, for change-out or maintenance. Flow regulation unit shall be adjustable with the valve in-line and the system in operation.

4.3. Flow regulation unit shall be externally adjustable to 1 of 41 different flow rates without limiting the stroke length; shall be available in 2 different psid operational ranges for 1/2"-1" and 1 psid operational ranges for 1"-1 1/2"; minimum range shall be capable of being activated by minimum 2.3 psid. Further, the flow regulation unit shall be capable of controlling the flow within  $\pm 10\%$  of rated flow or  $\pm 5\%$  of maximum flow.