Characterized Control Valves (CCV)

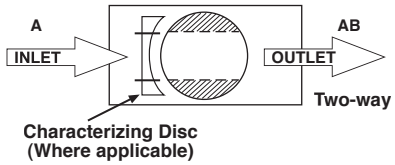
B2 (B) Series Characterized Control Valves

Two-way Valve with Stainless Steel Ball and Stem, Chrome Plated Brass Ball and Stem (B) 1/2" and 3/4" NPT female ends

Technical Data	
Service	chilled or hot water, 60% glycol
Flow characteristic	A-port equal percentage
Media temp range	0°F to 250°F [-18°C to 120°C] (½" to 2") 0°F to 212°F [-18°C to 100°C] (2½" to 3")
Maximum differential pressure (ΔP)	for characterized A-port 50 psi max (½" to 2") 30 psi max (2½" to 3")
Leakage	0% for A to AB

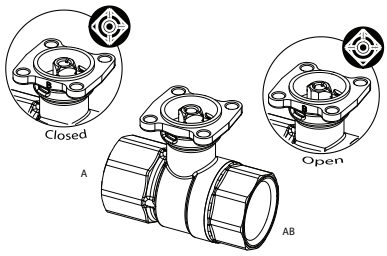
Flow Pattern

Two-way Characterized Control Valves™ (Belimo B2 (B) Series)



*Two-way valves should be installed with the disc upstream.

Valve should be installed with the disc upstream. If installed with disc downstream, Cv will be 5% reduced and flow curve will be deeper. If installed "backwards" it is NOT necessary to remove and change. No damage of control problems will occur.



B3 (B) Series Characterized Control Valves

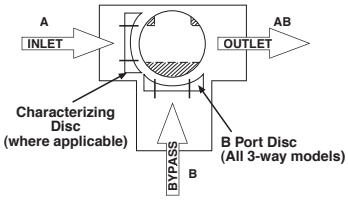
Three-way Valve with Stainless Steel Ball and Stem, Chrome Plated Brass Ball and Stem (B) 1/2" and 3/4" NPT female ends

Technical Data	
Service	chilled or hot water, 60% glycol
Flow characteristic	A-port equal percentage B-port modified linear for constant flow
Media temp range	0°F to 250°F [-18°C to 120°C]
Maximum differential pressure (ΔP)	for characterized A-port 50 psi max
Leakage	0% for A to AB, <2.0% for B to AB

Flow Pattern

Three-way Characterized Control Valves™ (Belimo B3 (B) Series)

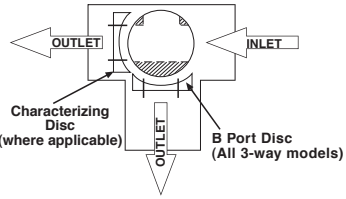
Three-way Mixing



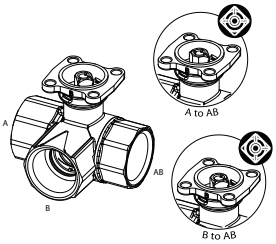
*The A-port must be piped to the coil to maintain proper control.

*The B-port yields 70% of the A-port flow.

Three-way Diverting



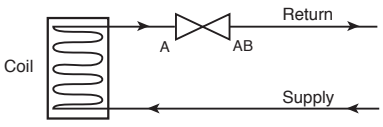
*The B port should be piped as the bypass port.



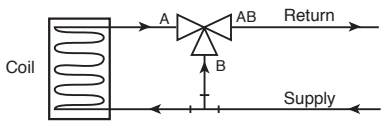
Operation/Installation

Correct Piping: 2-way valves should be installed with the disc upstream. If installed with disc downstream, flow curve will be deeper. If installed "backwards" it is NOT necessary to remove and change. No damage or control problems will occur.

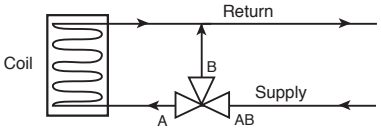
Two-Way Valve Piping Diagram
(1 Input, 1 Output)



Three-Way Mixing Valve Piping Diagram
(2 Inputs, 1 Output)



Three-Way Diverting Valve Piping Diagram
(1 Input, 2 Outputs)

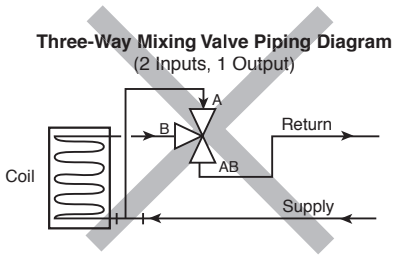


3-way valves must be piped correctly. They can be mixing or diverting. Mixing is the preferred piping arrangement.

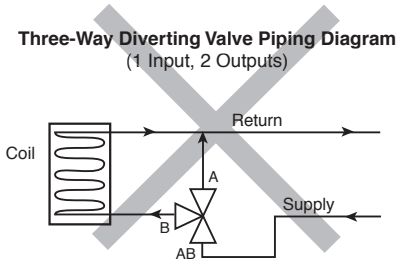
The A-port must be piped to the coil to maintain proper control. The B-port restricts flow by 30% of A-port value.

The BELIMO Characterized Control Valve is a CONTROL valve, not a manual valve adapted for actuation. The control port is the A-port. It is similar to the globe valve in that the middle port is the B or bypass port. The common port AB is on the main opposite the A-port. These diagrams are for typical applications only. Consult engineering specification and drawings for particular circumstances.

Three-Way Mixing Valve Piping Diagram
(2 Inputs, 1 Output)



Three-Way Diverting Valve Piping Diagram
(1 Input, 2 Outputs)



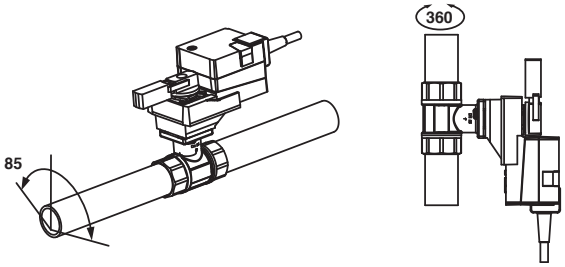
Incorrect Piping

WARNING! Do Not Pipe in this manner! Note Valve Porting! The A port must be piped to the coil! Not the B port!

Flow is not possible from A to B. If AB port is not piped as the common port, the valve must be re-piped. It is good practice to install a balancing valve in the bypass line. These valves are intended for closed loop systems. Do not install in an open loop system or in an application that is open to atmospheric pressure.

Mounting

The valves can be mounted in any position, except stem below horizontal.



The flange allows the actuator to be either parallel or perpendicular to the pipe; there are four orientations possible.

If field installing a spring return actuator, disconnect power and allow actuator to spring closed. Flip actuator over if necessary to achieve proper rotation direction. DO NOT USE THE REVERSING SWITCH TO DO THIS.

Two-way Valves Mounting

For NORMALLY CLOSED operation:
The ball of the valve must be rotated so that the ball is CLOSED to flow. The actuator should be mounted with the clamp fully rotated CW (R). Spring return actuators will show the CW (R) symbol near the clamp and position indicator. Depressing the gear release to move the clamp rotates non-spring return actuators.

For NORMALLY OPEN operation:
The ball of the valve must be rotated so that the ball is OPEN to flow. The actuator should be mounted with the clamp fully rotated CCW (L). Spring return actuators will show the CCW (L) symbol near the clamp and position indicator. Depressing the gear release to move the clamp rotates non-spring return actuators. There are marks on the top of the valve stem, which indicate the port directions.

Three-way Valves Mounting

The control port is ALWAYS the straight main run. The bypass port is ALWAYS the branch tee.

For NORMALLY CLOSED Control Port operation:
The ball of the valve must be rotated CW (R) so that the "A" port is CLOSED to flow. The actuator should be full CW (R) rotation of the clamp. Spring return actuators will show the CW (R) symbol near the clamp and position indicator. CCW (L) rotation of the actuator will open the control port and close the bypass port.

For NORMALLY OPEN operation:
The ball of the valve must be rotated CCW (L) so that the "A" port is OPEN to flow. The actuator should be full CCW (L) rotation of the clamp. Spring return actuators will show the CCW (L) symbol near the clamp and position indicator. CW (R) rotation of the actuator will close the control port and open the bypass port. There are marks on the top of the valve stem which indicate the port directions.

Then the actuator-linkage can be set onto the valve. The square hole of the adapter fits easily onto the square stem extension. Rotate the ball as necessary using a wrench.

Do not force. Do not use the actuator to turn the pipe or the stem. Do not use any toothed tool such as pliers, which may damage the stem.

- Check that the actuator rotates so that the valve seats for close off and also rotates open to achieve full Cv. Use the gear release or the AF crank to verify. For LF or NF models apply power and control signal if necessary.
- Verify that CCW (L) rotation of the actuator will open the ball to flow.
- Install and tighten the hold down screw not more than 1/2 turn beyond the point where resistance is felt.

Installation

1. Inspect shipping package, valve, linkage, and actuator for physical damage. If shipping damage has occurred notify appropriate carrier. Do not install.
2. Install valve with the proper ports as inlets and outlets. See drawings on page 1. Check that inlet and outlet of 2-way valves are correct; check that the "A", "B", and "AB" ports of three-way valves are piped correctly. Flow direction arrows must be correct.
3. Blow out all piping and thoroughly clean before valve installation.
4. Clean male pipe threads with wire brush and rag. If threads have been damaged or exposed to weather, running a tap or die over the threads may straighten them. Clean pipes, threads, and valve threads before installation; check for any foreign material that can become lodged in trim components. Strainers should be cleaned after initial startup.
5. Pipe sealing compound should be applied sparingly after cleaning and may not be applied to the two lead threads of a screwed pipe, which are innermost inside the valve. Sealing compound is to be placed on male threads only. The purpose is to lubricate the pipes when tightening.
6. Valve must be installed with the stem towards the vertical, not below horizontal.
7. Start the connection by turning the valve or pipe by hand as far as possible. Be certain the threads mate by the "feel" of the connection.
8. Use wrenches to tighten the valve to the pipe. Do not over tighten or strip the threads. Two wrenches are necessary to avoid damaging the valve.
9. Two-way valve Normally Open or Closed configurations must be verified by examining both the mechanical drawings and the valve and actuator. See details on page 1.
10. Three-way valve Normally Open or Closed configurations for the Control Port and the Bypass Port must be verified by examining both the mechanical drawings and the valve and actuator. See details on page 1.

Warning!

- Valve should not be used for combustible gas applications. Gas leaks and explosions may result. Do not install in systems, which exceed the ratings of the valve.
- Avoid installations where valve may be exposed to excessive moisture, corrosive fumes, vibration, high ambient temperatures, elements, or high traffic areas with potential for mechanical damage.
- Valve assembly location must be within ambient ratings of actuator. If temperature is below -22°F a heater is required.
- The valve assembly will require heat shielding, thermal isolation, or cooling if combined effect of medium and ambient temperatures – conduction, convection, and radiation – is above 122°F for prolonged time periods at the actuator.
- Following standard procedure, a strainer should be installed before the coil and valve or in another appropriate place in the system.
- Visual access must be provided. Assembly must be accessible for routine schedule service. Contractor should provide unions for removal from line and isolation valves.
- Avoid excessive stresses. Mechanical support must be provided where reducers have been used and the piping system may have less structural integrity than full pipe sizes.
- Sufficient upstream and downstream piping runs must be provided to ensure proper valve capacity and flow response. Five diameters in each direction are recommended.
- Life span of valve stems and O-rings is dependent on maintaining non-damaging conditions. Poor water treatment or filtration, corrosion, scale, other particulate can result in damage to trim components. A water treatment specialist should be consulted.
- Normal thread engagement between male pipe thread and valve body should be observed. Pipe run that is in too far will damage the valve.