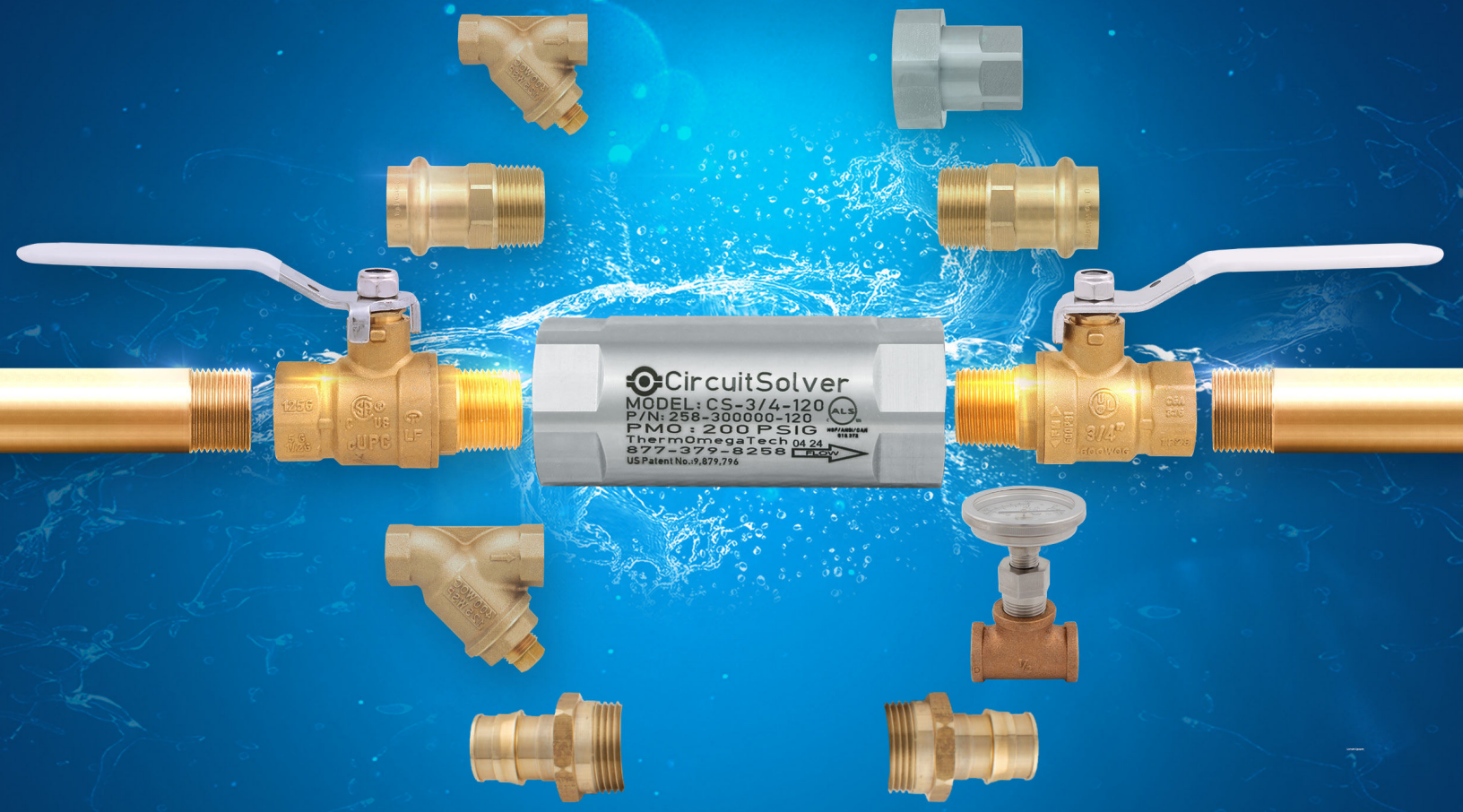
Embrace the Technology®

CircuitSolver®

A ThermOmegaTech® brand

Thermostatic Balancing Valves For Domestic Water



Offered in a variety of sizes from 1/2" to 2" with configurations including isolation valves, an integrated union, check valve, strainer, thermometer and press fitting connections

NSF

Certified to NSF/ANSI/CAN 61 & 372

AS9100D CERTIFIED ISO 9001

CircuitSolver.com
1-877-379-8258

Domestic Hot Water Recirculation Balancing

CircuitSolver®: How It Works

CircuitSolver® is a self-actuating thermostatic balancing valve that automatically and dynamically adjusts flow in a domestic hot water recirculation (DHWR) system to maintain the specified temperature at the end of each branch or riser.

Balancing the system in a fraction of the time, this valve eliminates time-consuming and expensive manual balancing labor during start-up and maintenance.

The Need: DHWR systems need to be balanced to ensure that hot water is available throughout a building on every floor, at every fixture, at all times.

The Problem: Buildings can have multiple branches and risers off the hot water main, and water flows in the path of least resistance which constantly changes in dynamic, open systems. Manual and fixed flow balancing valves rely on static flow and pressure calculations and cannot respond to the changing needs in a system.

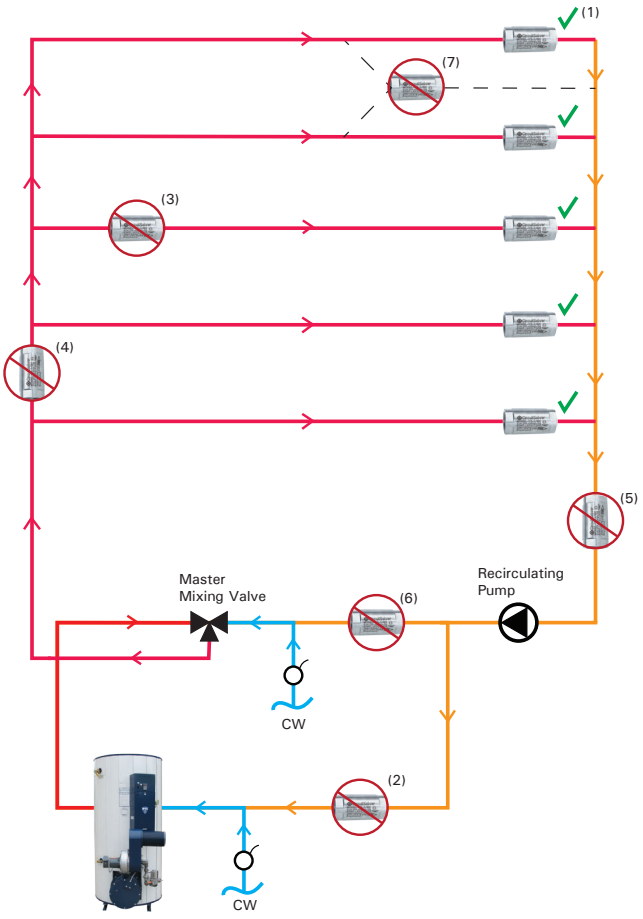
The Solution: Install a CircuitSolver® at the end of each branch, downstream of the last fixture and before the common return, and the system balances itself.

How It Works: The thermal actuator at the heart of the CircuitSolver® modulates the valve between open and closed in response to changing water temperature. This continuous response to temperature variation enables each hot water branch to quickly and consistently direct hot water flow to where it is needed – No manual balancing required.

Note: The valve never fully closes, allowing a small amount of bypass flow to the return to avoid deadheading the recirculation pump.

CircuitSolver® Placement Do's and Don'ts

(1) ✓ at the end of each branch/riser
(2) ⊘ in the return line back to the water heater
(3) ⊘ not in the middle of a branch/riser
(4) ⊘ not in a supply line
(5) ⊘ not in the return line
(6) ⊘ not after the recirculating pump
(7) ⊘ don't combine 2 branches/ risers



Valve Selection

Size: Select the size equivalent to the branch/riser feeding the return line.

Temperature: Select the set-point temperature equal to the desired return temperature.

Example: A standard CircuitSolver® installed on a 3/4" branch/riser with a 120˚F return temperature would be CS-3/4-120.

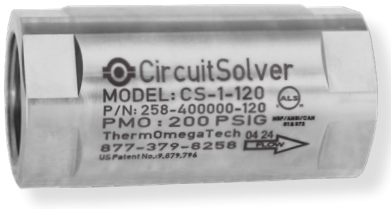
Why Choose CircuitSolver®?

- A temperature solution to a temperature problem
- Ideal for new construction and retrofits
- Industry leading 10-year warranty
- Lead free & NSF/ANSI/CAN 61 or 372 Certified
- Compliant with the Buy America Act and the Build America, Buy American Act
- Tamper Proof - Fixed set-point
- Stainless steel - corrosion resistant
- Range of sizes ½", ¾", 1", 1¼", 1½" & 2"
- High Cv maintains design intent
- Array of configurations compatible with standard piping materials

CircuitSolver® Product Catalog

CircuitSolver® (CS)

ThermOmegaTech's standard thermostatic, self-actuating balancing valve, CircuitSolver®, adjusts the flow through a domestic hot water recirculation system to maintain a specified return temperature at the end of each branch.





CircuitSolver® Union (CSU)

The CircuitSolver® Union features a union with an integrated O-ring for a leak-free seal and an optional integrated check valve to reduce the number of system components to be installed and minimize potential leak points.

CircuitSolver® Union Assembly (CSUA)

The CircuitSolver® Union Assembly adds isolation ball valves on either end of the CSU, further reducing leak points. Assembled and leak tested before delivery, the CSUA makes it easier to install and service.



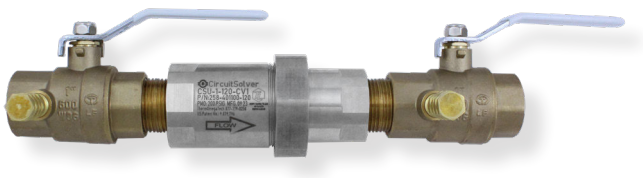


CircuitSolver® Union Strainer Assembly (CSUAS)

The CircuitSolver® Union Assembly is offered with an integrated strainer for water systems with dirt or particulate to facilitate system start-up and protect valve components and operation.

CircuitSolver® Union Assembly with PT Ports (CSUA-PT)

The CircuitSolver® Union Assembly with PT Ports adds pressure and temperature test ports to the isolation ball valves on either end of the CSU for ease of measuring data in your domestic water systems.

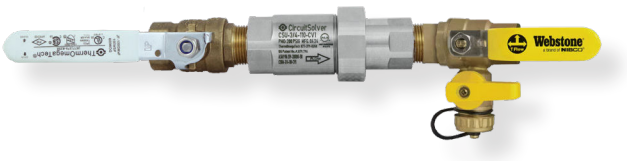


CircuitSolver®
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CIRCUITSOLVER® Accessories and Model Builder

CircuitSolver® Union Assembly with Webstone Drain Valve (CSUA-WDV)

The CircuitSolver® Union Assembly with Webstone® Drain Valve features an integrated Webstone® drain valve for easy system draining, flushing, and maintenance, minimizing downtime and eliminating disassembly.





CircuitSolver® with ProPEX® (CS-PX)

CircuitSolver® valves are offered with ProPEX® ends for seamless integration into ProPEX® Systems. The ProPEX® ends can be equipped to any CircuitSolver® configuration.

CircuitSolver® with ProPress® (CS-PP)

CircuitSolver® valves are offered with Viega ProPress® ends for seamless integration into ProPress Systems. Viega Smart Connect technology easily identifies unpressed connection points, saving time and labor costs. The ProPress ends can be equipped to any CircuitSolver® configuration.





CircuitSolver® Thermometer Assembly (CS-TW)

The CircuitSolver® thermometer monitors system temperature with an easy-to-read dial for instant hot water temperature verification. Offered in ½", ¾", and 1" sizes, the thermometer assembly can be purchased in any CircuitSolver® configuration or independently.

Model Selection:

CS __ __ __ __ - __ - XXX - __ - __ - __ - __

- **Blank** = standard; **U** = integrated union
- **Blank** = standard; **A** = assembly (2 integrated ball valves)
- **Blank** = standard; **S** = strainer
- **Blank** = standard; **PT** = PT Ports
- Line Size
  - All styles: ½", ¾", 1"
  - CS Only: 1¼", 1½", 2"
- Closing Temperature
  - 100°F (37.8°C)
  - 110°F (43.3°C)
  - 115°F (46.1°C)
  - 120°F (48.8°C)
  - 125°F (51.6°C)
  - 130°F (54.4°C)
  - 135°F (57.2°C)
  - 140°F (60.0°C)
- **Blank** = standard; **CV1** = check valve
- **Blank** = standard; **WDV** = Webstone Drain Valve
- **Blank** = standard; **TW** = thermometer
- **Blank** = standard; **PP** = ProPress ends; **PX** = ProPex ends

Max. Pressure: 200 PSIG (14 BAR)
Max. Temperature: 250°F (121°C)

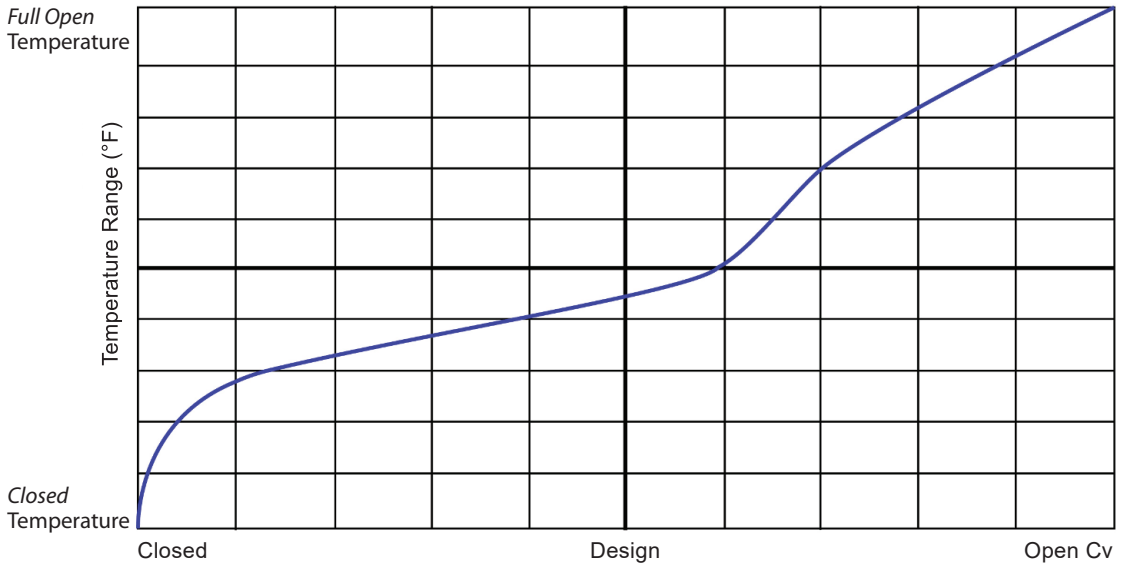
Examples:

1. Standard CircuitSolver® installed on a ½" line with 120°F return temperature: CS-1/2-120
2. CircuitSolver® Union with check valve installed on a ¾" line with 115°F return temperature: CSU-3/4-115-CV1

Additional temperature ranges available upon request—contact the factory for details.

CircuitSolver® Flow Chart

CircuitSolver® valves automatically modulate flow based on system demand, eliminating the need for manual adjustment. The Flow Chart below illustrates performance across different operating positions, demonstrating high Cv in the open position and controlled minimum flow as the valve approaches its setpoint, while never fully closing to maintain continuous bypass flow.



Valve Size		Cv	
½″	0.2	0.6	1.3
¾″	0.2	0.85	1.8
1″	0.2	1.57	3.3
1 ¼″	0.2	2.48	5.1
1 ½″	0.2	3.72	7.6
2″	0.2	7.02	14.2

Flow and Pressure Drop vs. CircuitSolver®

	Pressure Drop (PSI) per Valve Size at Design Cv					
GPM	**1/2″**	**3/4″**	**1″**	**1 1/4″**	**1 1/2″**	**2″**
0.25	0.17	0.09	0.03	0.01	0.00	0.00
0.5	0.69	0.35	0.10	0.04	0.02	0.01
0.75	1.56	0.78	0.23	0.09	0.04	0.01
1.0	2.78	1.38	0.41	0.16	0.07	0.02
1.25	4.34	2.16	0.63	0.25	0.11	0.03
1.5	6.25	3.11	0.91	0.37	0.16	0.05
1.75	8.51	4.24	1.24	0.50	0.22	0.06
2.0	11.11	5.54	1.62	0.65	0.20	0.08

Flow rate calculation using Cv factor.

$$GPM = C_v\sqrt{\Delta P}$$

$$C_v = \frac{GPM}{\sqrt{\Delta P}}$$

$$\Delta P = \left[\frac{GPM}{C_v}\right]^2$$

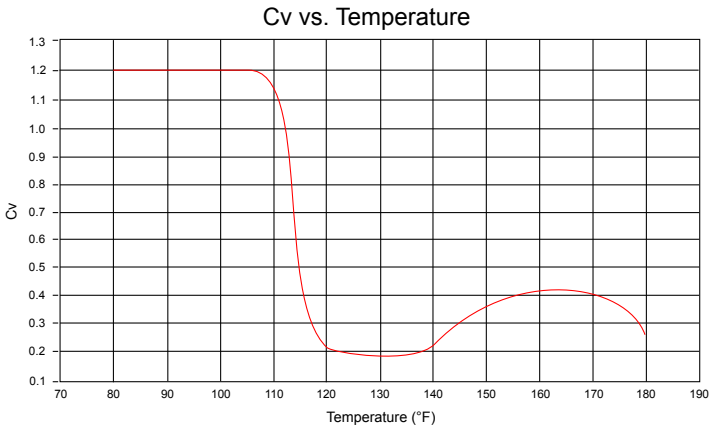
CircuitSolver® Union Thermal Disinfection (CSUTD-D)

As healthcare codes continue to evolve, system designers are prioritizing continuous circulation, stable temperatures, and reduced stagnation. These design principles align with guidance from the Facility Guidelines Institute, the leading authority for U.S. healthcare facility design standards.



The CircuitSolver® Union Thermal Disinfection Dual Balancing (CSUTD-D) valve has two thermal actuators to balance a domestic hot water system (DHWS) and allow for a thermal disinfection procedure to protect against Legionella growth.

How It Works: During normal conditions of a DHWS, the first (low temperature) actuator balances the system. When the water temperature through the valve reaches the set-point of the actuator, the CSUTD-D modulates to its closed position forcing hot water to flow to the other branches and risers maintaining a constantly balanced system.



During a thermal disinfection process, elevated water temperatures cause the low temperature actuator to reopen. When the water temperature reaches the set-point of the second (high temperature) actuator, the CSUTD-D modulates to its closed position again to keep the high temperature water at the fixtures.

This dual balancing design is ideal for systems disinfecting all at once, helping control flow and limit excessive temperatures in each branch or riser during disinfection cycles.

Model Selection:

During model temperature selection, the first temperature indicates the standard return line temperature and the second temperature indicates the maximum temperature during the sanitary flush process.

CSU__ __TD -D- __ - XXX/170 - __ - __ - __

- CSU__: blank = standard; A = assembly (2 integrated ball valves)
- __TD: blank = standard; S = strainer
- -D- __: Line sizes: ½", ¾", 1"
- XXX/170: Closing Temperature
  - 110°F (43.3°C)
  - 115°F (46.1°C)
  - 120°F (48.8°C)
  - 125°F (51.6°C)
  - 130°F (54.4°C)
  - 135°F (57.2°C)
  - 140°F (60.0°C)
- - __: Blank = standard; CV1 = check valve
- - __: Blank = standard; PP = ProPress ends; PX = ProPex ends
- - __: Blank = standard; TW = thermometer

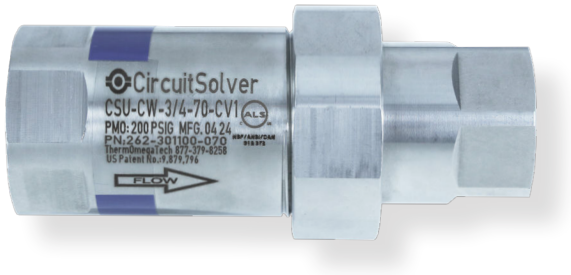
Max. Pressure: 200 PSIG (14 BAR)
Max. Temperature: 250°F (121°C)

Examples:

1. CSUTD-D installed on a ½" line with 120°F return temperature during standard usage and 170°F return temperature during high temperature flush disinfection process: CSUTD-D-1/2-120/170.
2. CSUTD-D with check valve and thermometer installed on a ¾" line with 115°F return temperature during standard usage and 170°F return temperature during high temperature flush disinfection process: CSUTD-D-3/4-115/170-CV1-TW.

CircuitSolver® Cold Water Balancing (CSU-CW)

To discourage Legionella growth, cold water systems should be recirculated and balanced to keep water temperatures evenly distributed in branches or risers. Maintaining cold water temperatures below 68°F (20°C) is critical, as this is the range where Legionella begins to colonize.



The CircuitSolver Union Cold Water (CSU-CW) thermostatic balancing valve helps maintain these conditions by automatically and dynamically balancing cold water recirculation systems.

Supporting Legionella Mitigation in Cold Water Systems: To address Legionella risk in facilities where occupants sleep or stay, the Veterans Health Administration implemented cold water recirculation systems as part of a proactive water management strategy. VHA Directive 1061(1) recognizes that controlling temperature rise and maintaining appropriate disinfectant levels are critical during periods of low flow or non-use. The Veterans Affairs plumbing design manual (section 4.2.9) also states that thermostatic balancing valves should be used on both hot and cold water recirculation systems.

Incorporating CircuitSolver Union Cold Water balancing valves supports these directives and can help mitigate hazardous conditions within cold water distribution systems.

How It Works: The CSU-CW responds to water temperature to balance flow throughout the system.

- When the water temperature in a supply branch is below the valve set point of 70°F, the valve remains in its closed position with limited flow to the return.
- As water temperature rises above the set point, the valve opens to establish circulation through the branch.
- When cooler water returns and the temperature drops below the set point again, the valve returns to its closed position.

This self-regulating operation maintains uniform cold water temperatures, limits temperature rise in low flow conditions, and helps keep cold water moving throughout the system.

Model Selection:

CS __ __ - CW - __ - XXX - __ - __

- CS __ __: Blank = standard; U = integrated union
- __ __: Blank = standard; A = assembly (2 integrated ball valves)
- __: Line sizes: ½", ¾", 1"
- XXX: Closing Temperature — 060°F (15.6°C); 065°F (18.3°C); 070°F (21.1°C)
- __: Blank = standard; CV1 = check valve
- __: Blank = standard; TW = thermometer

Max. Pressure: 200 PSIG (14 BAR)
Max. Temperature: 250°F (121°C)

Examples:

1. CircuitSolver® Union Cold Water on a ½" line with 70°F return temperature: CSU-CW-1/2-70
2. CircuitSolver® Union Cold Water with check valve installed on a ¾" line with 70°F return temperature: CSU-CW-3/4-70-CV1

CircuitSolver® FAQ's

What is the pressure drop across a CircuitSolver®?

To get a basic approximation for the pressure drop across a CircuitSolver® valve within a given branch, utilize the following equation where Cv = design Cv and flow is the estimated flow to offset heat loss in the branch:

For this example:
Cv = .85 (design Cv for ¾" CircuitSolver®)
Flow = 1 GPM (estimated flow to offset heat loss in a given branch)
ΔP = [GPM/Cv]2 = [1/.85]2 = 1.4 psi

Does CircuitSolver® fully close?

No, there is a designed bypass (0.2 GPM) built into CircuitSolver® valves even when "closed." This is done so the distribution branches are not completely dead ended. In some applications where the water distribution piping is occasionally chemically or thermally sterilized, this leakage allows enough flow through the system to accomplish the cleaning, regardless of temperature.

Can CircuitSolver® valves be installed in any orientation?

Yes, CircuitSolver® valves will function properly in any orientation. The only exceptions are valves with an integrated check valve, which must be installed with the flow arrow facing the return line, and the strainer model, which requires horizontal installation.

What are the advantages of the CSU – CircuitSolver® with union and an optional check valve?

The CSU is an integrated solution incorporating a union with an "o" ring face seal and an optional check valve. By having the union and check valve integrated, you save cost and labor, reduce the number of potential leak points, and have a more compressed, reliable assembly.

Can CircuitSolver® directly replace existing manual/adjustable valves in a building?

Yes, CircuitSolver® valves can typically be installed in the same locations where the manual or adjustable valves were originally placed. In most retrofit applications, CircuitSolver® will fit directly into the existing balancing-valve connection points, allowing the system to be upgraded without major piping changes. This new system becomes self-adjusting and dynamically balances flow based on temperature, helping resolve many hot-water recirculation issues caused by balancing.

Can CircuitSolver® be installed in a system where other types of balancing valves already exist?

Yes, CircuitSolver® valves can be installed in systems that already contain other types of balancing valves. CircuitSolver® modulates flow based on temperature rather than a fixed manual setting. They are designed with Cv values that allow appropriate flow when the valve is open, which will typically improve overall system performance by diverting more hot water to reach under-served areas once temperatures are satisfied.



AVAILABLE ONLINE FOR ALL PRODUCTS

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