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AURORA®

CIRCUIT BALANCING VALVES 1/2" – 12"

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Circuit Balancing Valves 1/2" – 12"

Balancing Basics

CBVs are installed in heating and cooling systems to obtain the design flow rates through each circuit in the building. Using the mechanical engineer's design drawings, the balancing contractor carefully adjusts each balancing valve throughout the HVAC system to ensure the engineer's design intent is met, and that the correct flow rate is achieved in each circuit. Performance curves correlate the pressure drop, or ΔP, across the valve to the flow rate through the same valve. Using these curves, the design flow is achieved by adjusting the CBV handwheel until the target ΔP, and thus flow rate, is reached.

What Is a Circuit Balancing Valve?

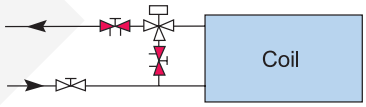
Although several manufacturers claim their valves are CBVs, few perform as effectively as true balancing valves. It is generally agreed that a quality balancing valve has the following characteristics:

- Multiturn adjustment range for maximum control.
- Pressure/Temperature ports for measuring differential pressure.
- Positive shutoff/isolation capability (according to ASHRAE guidelines).
- Memory setting feature – preferably hidden, to avoid inadvertent tampering with the set point.
- Micrometer-type handwheel adjustment with easily readable settings.
- Measured vs. actual flow rate accuracy of at least 95% across the recommended operating range.

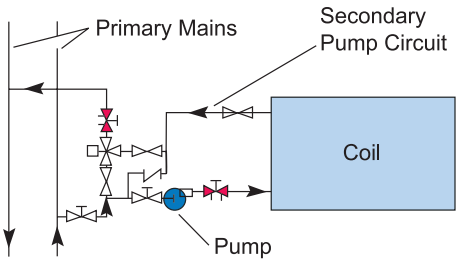
Most engineers specify that balancing valves be installed on the return side of each branch, downstream of the branch's terminal unit(s).

Ideally, these CBVs are selected based on the design flow through them, rather than the size of the pipe in which they are to be installed. However, in many instances, balancing valves are installed 'at line size', which has historically posed problems for accurate balancing. Aurora circuit balancing valves eliminate this problem for piping up to 2" in diameter.

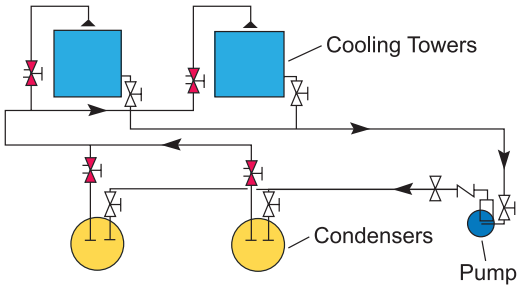
Typical Applications



Coil – CW or HW



Primary-Secondary Connections



Cooling Tower & Chiller Connections

Indicates CBV

Valve Features

Accurate and Fast Balancing

- The patent-pending design of Aurora's venturi style balancing valves produces significantly higher balancing accuracy than with conventional balancing valves.
- Outstanding accuracy of ΔP measurement – from a minimum of 97% in the fully open position to 95% at nearly closed (1/2 turn open). Dramatically higher than the 84% published for competitive valves.
- The process of balancing is faster and easier. Since ΔP is measured across the valve's fixed orifice (venturi), flow rate through the valve is directly proportional to ΔP. With conventional valves, where pressure drop is measured across the entire valve, balancing contractors need to record both ΔP and handwheel position to determine flow rate.
- Innovative flow smoothing fins reduce turbulence of the fluid moving past the valve seat, lowering the total ΔP across the valve.

Energy Saving Design

Aurora 1/2" to 2" balancing valves have five full 360° turns from open to closed, providing unparalleled flow control. That's 20 times the controllability of a 1/4" turn 'circuit-setter' valve. Better control means less overpumping, resulting in energy savings.

Compact and Versatile Design

Aurora 1/2" to 2" balancing valves can be installed with the measuring ports facing up or down. The 'hidden' memory set screw is easy to adjust without having to remove the handle cap. Aurora valves use a nonrising handle design, so the overall valve height remains the same from fully open to fully closed. In addition, 'triple-sealing' O-rings provide optimal leakage protection by creating a pressure gradient barrier through the stem.

CBVs Can Be Installed at Line Size

Balancing valves are frequently selected based on the size of the line where they will be installed rather than the design flow through those valves. This often results in oversized valves that need to be throttled severely during balancing. To solve this problem, Aurora 1/2" to 2" balancing valves are designed to be selected based on line size, and to deliver an optimal combination of flow rate and pressure drop when used in systems designed according to ASHRAE guidelines.

Accessories

Aurora has a wide range of accessories to complement our selection of balancing valves.

Aurora Flange Adapter – Equipped with unique antirotation lugs to ensure a rigid flanged valve installation.



EPDM Flange Adapter Gasket



Aurora Ductile Iron Flange Adapter

Flow Rate Ranges

Valve Size	Min. Flow	Max. Flow
1/2" LF	0.26 (0.016)	2.2 (0.14)
3/4" LF	0.40 (0.025)	3.4 (0.21)
1/2"	1.4 (0.086)	10.4 (0.66)
3/4"	2.1 (0.13)	13.5 (0.85)
1"	5.2 (0.33)	20.2 (1.28)
1-1/4"	8.2 (0.52)	35.5 (2.24)
1-1/2"	8.1 (0.51)	48.9 (3.09)
2"	14.0 (0.88)	83.3 (5.25)

Note: Flow in USGPM (L/s).

Valve Features

Engineers

High performance, full featured Aurora circuit balancing valves can be specified with confidence by engineers. Optimum balance of control and C_v ensures the engineer's design intent is met with a minimum of energy consumption.

Installing Contractors

Aurora CBVs can be installed 'at line size' without having to install costly reducers. Balancing accuracy will be a minimum of 95%, even down to 0.5 turns, due to the high-precision fixed-venturi orifice.

Balancing Contractors

- Since differential pressure is upstream of the valve seat, a stable ΔP signal as low as 3" of water can be achieved.
- As ΔP is measured across a fixed orifice rather than across the seat of the valve (where the valve opening can vary), the pressure drop is directly proportional to the flow rate through the valve. This results in a faster and more accurate balancing job.
- The stable signal achieved with Aurora valves ensures that valves can be accurately balanced even at low valve openings.

Building Owners

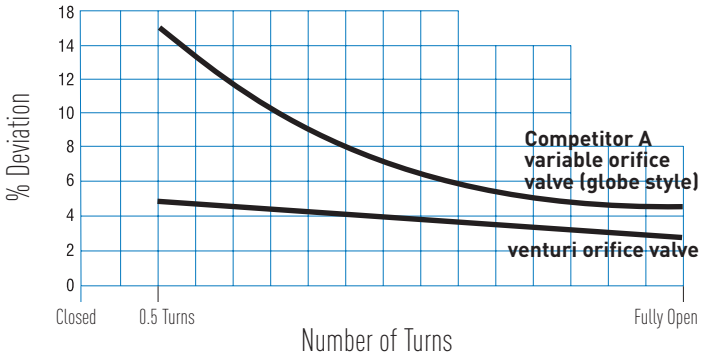
- More accurate balancing with Aurora CBVs helps ensure that correct flow rates are achieved in each circuit, resulting in greater occupant comfort and improved tenant satisfaction.
- More precise balancing with Aurora CBVs means the correct amount of fluid flows through each circuit. When the system is completely balanced, the impeller of the main system pump can be trimmed, thereby eliminating costly overpumping.
- The triple-sealing O-ring design of Aurora CBVs produces a pressure gradient through the sealing area. Two O-rings handle the pressure across the seal, while the third one actually does the sealing. This patent pending design ensures the longevity of these valves even in systems operating at up to 300 psi. ASHRAE guidelines.

Design Innovations

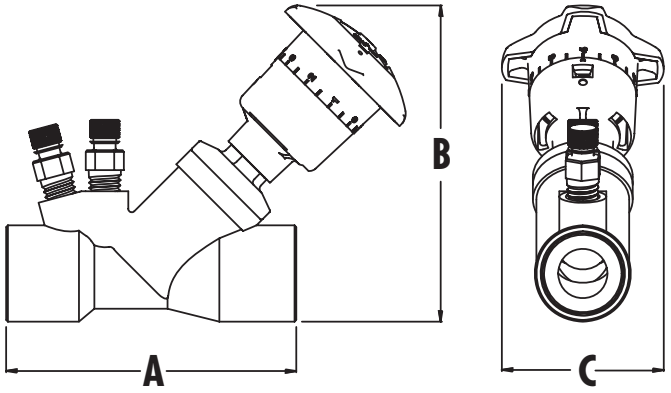
- Split case valves (2-1/2" to 12") that can be easily converted between straight and angled orientation, allowing mechanical contractors unparalleled flexibility in valve installation.
- Line sizing of valves (1/2" – 2" models) and a 95% flow accuracy that allows contractors to confidently install these CBVs at line size.
- Precision-machined venturi-style orifice provides ultrastable pressure signal, resulting in significantly higher balancing accuracy than traditional CBVs.
- Flow straightening vanes (1/2" – 2" models) that allow contractors to reduce the number of pipe diameters downstream from CBV installation.

Design Information

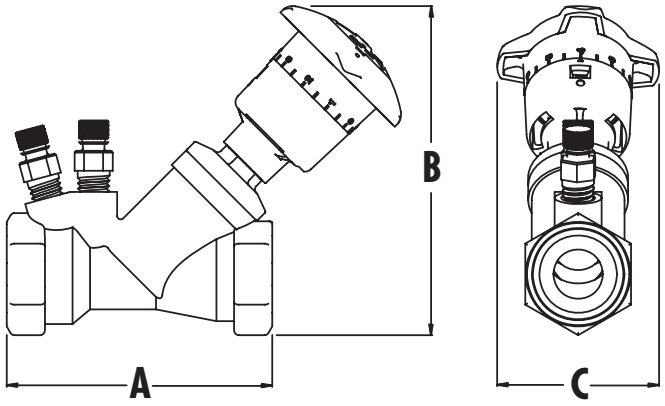
Models: CBV-S5 (Solder), CBV-NPT5 (NPT)		
Max. Working Pressure		300 psi/20 bar (PN20)
Operating Temperature Range		–4°F to 300°F (–20°C to 150°C)
Materials of Construction	Body, Bonnet	Brass Alloy CW617
	Stem and Disc	Brass Alloy B16
	Elastomers	EPDM
	Handwheel	Reinforced Nylon; ABS



Dimensional Details



Model CBV-S5



Model CBV-NPT5

Model	Pipe Size	A	B	C	Shipping Weight
CBV50S5-LF	1/2" (DN15) Low Flow	3.19 (81)	4.56 (116)	2.76 (70)	1.05 (0.48)
CBV75S5-LF	3/4" (DN20) Low Flow	3.64 (93)	4.65 (118)	2.76 (70)	1.09 (0.49)
CBV50S5	1/2" (DN15)	3.19 (81)	4.56 (116)	2.76 (70)	1.05 (0.48)
CBV75S5	3/4" (DN20)	3.64 (93)	4.65 (118)	2.76 (70)	1.09 (0.49)
CBV1S5	1" (DN25)	4.26 (108)	4.95 (126)	2.76 (70)	1.68 (0.76)
CBV125S5	1-1/4" (DN32)	4.94 (125)	5.40 (137)	2.76 (70)	2.26 (1.03)
CBV150S5	1-1/2" (DN40)	5.67 (144)	5.60 (142)	2.76 (70)	3.22 (1.46)
CBV2S5	2" (DN50)	7.03 (179)	6.36 (162)	2.76 (70)	5.40 (2.45)

Model	Pipe Size	A	B	C	Shipping Weight
CBV50NPT5-LF	1/2" (DN15) Low Flow	2.99 (76)	4.60 (117)	2.76 (70)	1.07 (0.49)
CBV75NPT5-LF	3/4" (DN20) Low Flow	3.26 (83)	4.90 (125)	2.76 (70)	1.21 (0.55)
CBV50NPT5	1/2" (DN15)	2.99 (76)	4.60 (117)	2.76 (70)	1.07 (0.49)
CBV75NPT5	3/4" (DN20)	3.26 (83)	4.90 (125)	2.76 (70)	1.21 (0.55)
CBV1NPT5	1" (DN25)	3.80 (97)	5.29 (126)	2.76 (70)	1.86 (0.84)
CBV125NPT5	1-1/4" (DN32)	4.32 (110)	5.60 (142)	2.76 (70)	2.34 (1.06)
CBV150NPT5	1-1/2" (DN40)	5.07 (129)	5.90 (150)	2.76 (70)	3.49 (1.59)
CBV2NPT5	2" (DN50)	6.00 (153)	6.68 (170)	2.76 (70)	5.97 (2.46)

Note: All dimensions are in inches (mm) and weights in lbs. (kg)

Valve Details and Assembly

Innovative Convertible Design

Aurora 2-1/2" through 12" CBV's are furnished in either angled or straight patterns, and can be conveniently changed to either configuration at the site using standard tools and without any additional parts. This is possible because the innovative valve body has been split on a 45° angle, and is secured by four body bolts. Rotating one half of the body 180° produces a 90° change in flow direction. All Aurora valves in this size range are field-convertible to straight or 90° angle, regardless of how they were furnished originally and field conversion does not reduce valve accuracy. Valves are furnished with either industry standard grooved ends or flanges.

Flexible Installation

Aurora CBVs can be used in either a conventional straight installation or to replace angles or elbows in the piping system. This flexibility ensures that the valve can be installed in the most cost effective and accessible position. The angle configuration eliminates a piping elbow and two welded joints, resulting in reduced installation costs.

Model		CBVS/CBVA								CBVSG/CBVAG							
Connection Size ANSI 125# Flange		2-1/2	3	4	5	6	8	10	12	2-1/2	3	4	5	6	8	10	12
Handwheel – No. of 360° turns		5	5	6	6	6	12	12	14	5	5	6	6	6	12	12	14
Max. Working Pressure		250 psi (1725 kPa)								250 psi (1725 kPa) when used with Class 125/150 flange adapter 375 psi (2575 kPa) when used with Class 250/300 flange adapter							
Max. Working Temp.		230°F (110°C)[1]								230°F (110°C)[1]							
Materials of Construction	Body	Cast Iron ASTM A48 Class 30B								Ductile Iron ASTM A536 GR65-45-12							
	Disc	Bronze ASTM B584 C-84400								Bronze ASTM B584 C-84400							
	Seat	EPDM Elastomer								Ultra High Strength Engineered Resin							
	Stem	Brass ASTM B-16								Brass ASTM B-16				Stainless Steel ASTM A582 Type 416			
	Trim	Brass ASTM B283 C-37700								Brass C-37700							
	O-Ring	Buna & EPDM Elastomer								Buna							
Insulation		Optional[2]								Optional[2]							
Pressure Metering Ports 1/4" (2)		NPT Brass Body with EPDM[3] Check and Gasketed Cap								NPT Brass Body with EPDM[3] Check and Gasketed Cap							
Drain Tappings 1/4" (2) Brass Plug		Brass Plug															

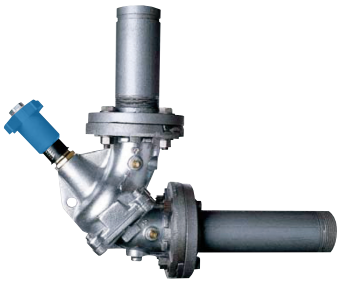
Notes:

1. Optional Viton® for 2-1/2" to 6" sizes elastomers for temperatures up to 300°F (150°C).
2. Optional preformed insulation is available to meet ASTM D 1784/ Class T4253-C, MEA #7-87, ASTM E-84 and ASTM E-136 with a flame spread rating of 25 or less and a smoke development rating of 50 or less.
3. EPDM is not suitable for oil service.

Field-convertible from angled to straight. Multiturn flow adjustment capability from 5 turns in 2-1/2" up to 14 turns in 12" models.



2-1/2" – 12" Model CBVSG straight configuration.



Flanged Model CBVA showing 90° angle installation.

Engineering Specifications

1/2" – 2" Valves

Furnish and install, as shown on plans and in accordance with manufacturer's installation instructions, Aurora Circuit Balancing Valves. Valves are to be of the 'Y' pattern, equal percentage globe-style and provide three functions: 1) Precise flow measurement, 2) Precision flow balancing, 3) Positive drip-tight shutoff. Valve shall provide multiturn, 360° adjustment with micrometer type indicators located on the valve handwheel. Valves shall have a minimum of five full 360° handwheel turns. 90° 'circuit-setter' style ball valves are not acceptable. Valve handle shall have hidden memory feature, which will provide a means for locking the valve position after the system is balanced.

Valves shall be furnished with precision machined venturi built into the valve body to provide highly accurate flow measurement and flow balancing. The venturi shall have two, 1/4" threaded brass metering ports with check valves and gasketed caps located on the inlet side of the valve. Valves shall be furnished with flow smoothing fins downstream of the valve seat and integral to the forged valve body to make the flow more laminar. The valve body, stem and plug shall be brass. The handwheel shall be high-strength resin.

2-1/2" – 12" Valves

Furnish and install, as shown on plans and in accordance with manufacturer's installation instructions, Aurora Circuit Balancing Valves. Valves are to be of the 'Y' pattern, equal percentage globe-style and provide three functions: 1) Precise flow measurement, 2) Precision flow balancing, 3) Positive drip-tight shutoff. Valve shall provide multiturn, 360° adjustment with micrometer type indicators located on the valve handwheel. Valves shall have a minimum of five full 360° handwheel turns. 90° 'circuit-setter' style ball valves are not acceptable. Valve handle shall have hidden memory feature, which will provide a means for locking the valve position after the system is balanced.

Valve body shall be either cast iron with integrated cast iron flanges (2-1/2" to 12") or ductile iron with industrial standard grooved ends (2-1/2" to 12"). Valve stem and plug disc shall be bronze with ergonomically designed handwheel that permits multiturn adjustments. Sizes 2-1/2" and 3" – 5 turns; sizes 4" to 6" – 6 turns; sizes 8" and 10" – 12 turns and size 12" – 14 turns. Aurora flange adapters shall be supplied, to prevent rotation.

The valve shall be installed with flow in the direction of the arrow on the valve body and installed at least five pipe diameters downstream from any fitting, and at least ten pipe diameters downstream from any pump. Two pipe diameters downstream from the CBV should be free of any fittings. When installed, easy and unobstructed access to the valve handwheel and metering ports for adjustment and measurement are to be provided. Mounting of valve in piping must prevent sediment build-up in metering ports.







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