xylem

Circuit Sentry™

Pressure independent flow limiting valves



Featuring press connect fittings. Faster. Easier. Safer.

Bell & Gossett
xylem

Balance HVAC cooling and heating circuits with precision

Xylem's Bell & Gossett Circuit Sentry is a calibrated automatic flow limiting valve with a precision machined ball type shutoff valve and commissioning measurement ports. The valve is designed to use flow limiting to balance both HVAC cooling and heating circuits. However, it is not designed for use in potable water systems. The use of an integral automatic flow rate cartridge allows an operator to easily flush the piping upon commissioning the system.

The flow cartridge maintains the flow rate in the controlled circuit. It maintains an optimum flow rate at a constant level, even under fluctuating pressure conditions ranging from as little as 2 PSI to as much as 60 PSI of differential pressure. In a properly designed system, the valve automatically ensures system balance, regardless of changing pressure conditions normally associated with variable speed pumping.

Integral P/T ports for a needle system and/or a drain are available as options. Also, a variety of end connections on brass single-cartridge valves from 1/2" to 2" in size are available, with either female NPT, female sweat, or press connect fixed ends. A union end press connect, sweat, female NPT, or male NPT is also available. Multi-cartridge wafer valves are available in sizes 2-1/2" thru 20", and are designed for installation between identical flanges in the system piping. All valves are normally equipped with capped readout ports – 1" long for brass valves and 4" long for wafer valves – fitted with internal check valves.

Get peak operating performance from HVAC systems automatically

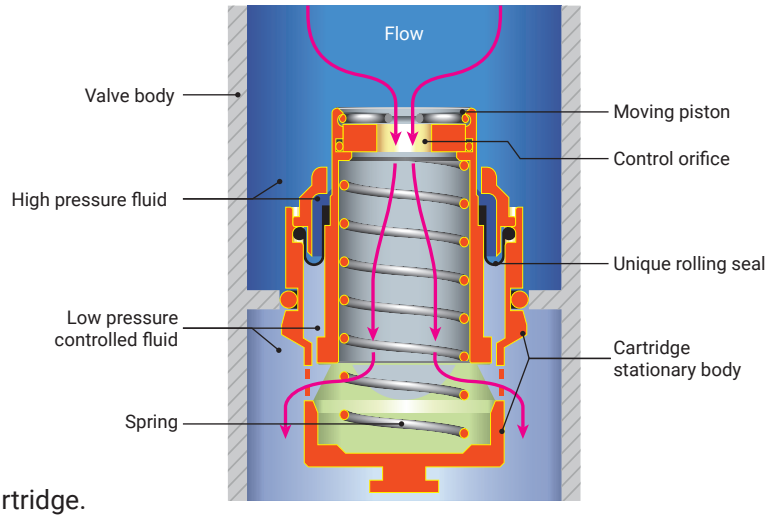
- Keeps constant fluid flow, automatically compensating for fluctuating pressure conditions
- Eliminates overflows, reducing energy costs and improving occupant comfort
- Unique diaphragm pressure control element allows one cartridge for most systems
- Large open flow paths for clog-free operation
- No requirement on pipe lengths before and after the valve for easier application and piping
- Broad product size range (1/2" to 20")
- Flow range from 0.33 GPM to 7,200 GPM



A rolling seal makes the difference

A unique rolling seal separates the high-pressure fluid from the lower-pressure controlled fluid.

- Flow control is more accurate
- Flow rates are field adjustable
- All flow is controlled
- Valve life is extended
- A wider range of operation is available
- Valve hunting is eliminated



All flow must go through the orifice plate entrance of the cartridge. Flow has been eliminated between the moving piston and the stationary body, so all flow is controlled. Any velocity noise or valve chatter that could be caused by the bypassing fluid is also eliminated.

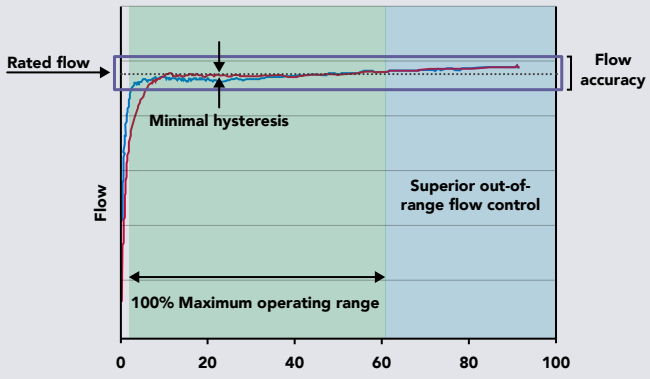
Thanks to the use of opposing forces, the cartridge never fully seats, leaving wide-open flow channels and preventing the spring distortion found in other cartridges. This means that, at the design range of the cartridge, the ports are wide open and the unit will pass solids up to 1/16" in diameter.

Engineered flow paths act as pressure snubbers, to stabilize pressure control. In conjunction with the EPDM rolling seal, this snubbing effect controls the speed of the piston movement, reducing wear on the cartridge parts. It also eliminates any possibility for the piston to rapidly bottom out, causing an annoying water hammer type of noise.

A tale of two valves

While both valves represented here control flow to +/- 10%, “Brand X” does it at 15% less flow than required. The control is within a limit, but it’s not the rated limit. Plus, it provides less differential pressure operating range than the unique features of the Circuit Sentry flow controller provide. Those features also help stabilize overall flow control, eliminating cycling between high and low limits. In addition, rising (red) and falling (blue) differential pressure curves exhibit less hysteresis (a difference in flow at the same measuring point common to mechanical control devices). As with any variable orifice valve, after the flow control element reaches its rated operating differential pressure, flow immediately increases outside the rated accuracy. However, the superior pressure regulating flow controller of the Circuit Sentry continues to maintain steady control of the rated flow.

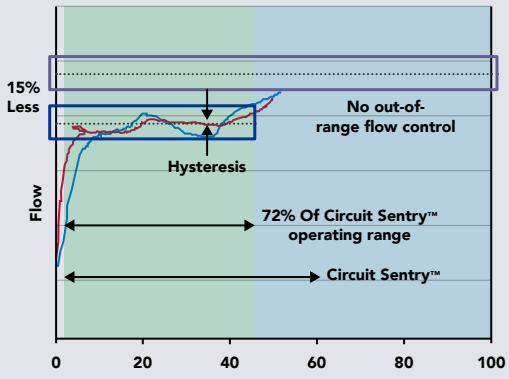
Circuit Sentry™ flow test



Differential pressure (PSI)

The unique features of the cartridge and the unprecedented control of branch flow for any HVAC circuit can be seen in graph 1. Even when differential pressure is increased to 1.5 times the rated operation of the cartridge flow, control is maintained.

Brand “X” flow test



Differential pressure (PSI)

Variable-orifice cartridges aren’t designed for this precise flow control, and often require as many as four different spring ranges to achieve similar results for one flow.

Circuit Sentry Model AC Valve

Valve size fixed end	Fixed end options	Dimensions* inch (mm)			Tailpiece options	Approx. weight lbs. (kg)
		W (Max)	L (Max)	H (Max)		
1/2"	Sweat female NPT female Press connect	3.1 (82)	5.3 (135)	3.4 (86)	Sweat female NPT female NPT male Press connect	2.4 (1.1)
3/4"		3.2 (82)				2.5 (1.1)
1"		3.5 (90)	6.2 (157)			2.6 (1.2)
			6.1 (155)			
1"L		3.8 (96)	8.5 (215)	4.6 (117)		7.1 (3.2)
			8.3 (210)			
1-1/4"		4.5 (115)	8.7 (220)			7.2 (3.3)
			8.4 (214)			
1-1/2"		4.8 (121)	8.8 (223)			
			8.5 (216)			
2"R			11.8 (300)			9.8 (4.4)
			10.1 (257)			9.0 (4.1)
1-1/2"L		5.1 (129)	11.3 (287)	6.1 (156)		16.7 (7.6)
			11.5 (291)			
2"		5.6 (141)	12.7 (322)			16.9 (7.7)
			11.9 (302)			17.4 (7.9)

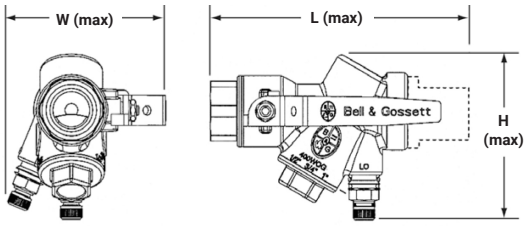
Circuit Sentry Wafer Valve

Size inch (mm)	Dimensions* inch (mm)			Maximum Flow** GPM (L/s)	Maximum cartridges per valve	Approx. shpg. wt. w/max. cartridges lbs. (kg)
	A	B	L			
2-1/2" (63.5)	4.7 (119)	9.3 (237)	6.7 (170)	180 (11.4)	1	12 (5.4)
3" (76.2)	5.2 (131)	9.8 (249)	6.7 (170)	180 (11.4)	1	14 (6.4)
4" (101.6)	6.4 (163)	11.1 (281)	6.7 (170)	360 (22.7)	2	22 (10)
5" (127)	7.6 (193)	12.2 (311)	6.7 (170)	540 (34.1)	3	28 (12.7)
6" (152.4)	8.5 (216)	13.1 (334)	6.7 (170)	720 (45.4)	4	31 (14.1)
8" (203.2)	10.7 (271)	15.3 (389)	6.7 (170)	1,260 (79.5)	7	51 (23.1)
10" (254)	12.8 (326)	17.3 (440)	6.7 (170)	2,160 (136.3)	12	69 (31.3)
12" (304.8)	15.1 (383)	19.7 (501)	6.7 (170)	2,700 (170.3)	15	95 (43.1)
14" (355.6)	17.4 (443)	22.1 (561)	6.7 (170)	3,420 (215.8)	19	123 (55.8)
16" (406.4)	19.5 (496)	24.6 (624)	6.7 (170)	4,680 (295.3)	26	166 (75.3)
18" (457.2)	21.5 (545)	26.5 (673)	6.7 (170)	5,940 (374.8)	33	193 (87.5)
20" (508)	23.9 (607)	28.7 (729)	6.7 (170)	7,200 (454.2)	40	228 (103.4)

* All dimensions +/– 0.125" (3.2 mm) tolerance. Dimensions are subject to change. Not to be used for construction purposes unless certified.

** Bell & Gossett recommends following ASHRAE's design criteria for hydronic system piping, flow rates, and friction losses.

For additional information see submittals A-606.16, A-606-22, A-606.50 and A-622.



Flow range: 0.33 GPM to 150 GPM

Accuracy: +/- 10%

Materials of construction

Body: Brass

Ball: Chrome plated brass

Ball seal: PTFE

Spring: 304 Stainless steel

Cartridges: Type 10, 11, 20, 21, 30, & 40: Brass

Type 50 & 60: 304 Stainless steel

O-rings: EPDM

Diaphragm: Reinforced EPDM

Operating limits

Maximum working pressure:

NPT & sweat: 400 PSIG (2,758 kPa)

Press: 200 PSIG (1,380 kPa)

Temperature range:

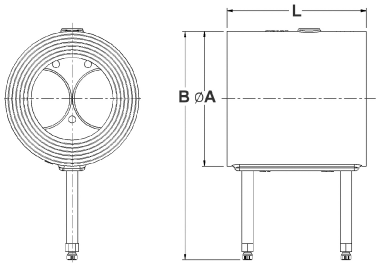
NPT & sweat: -4°F (-20°C) to 250°F (121°C)

Press: 32°F (0°C) to 200°F (93°C)

Control range

Min: See submittal A-606.22

Max: 60 PSID



Flow range: 15 GPM to 7,200 GPM

Accuracy: +/- 10%

Materials of construction

Body: Ductile iron

Cartridge: 304 Stainless steel

O-rings: EPDM

Diaphragm: Reinforced EPDM

Spring: 304 Stainless steel

Operating limits

Maximum working pressure: 250 PSIG (1,724 kPa)

Temperature range: -4°F (-20°C) to 230°F (111°C)

Control range

Min: See submittal A-606.22

Max: 60 PSID

Learn more about Circuit Sentry Valves

Xylem
8200 N. Austin Avenue
Morton Grove, Illinois 60053

Tel +1 847.966.3700
Fax +1 847.965.8379
www.xylem.com/bellgossett

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