Introduction to Characterized Control Valves

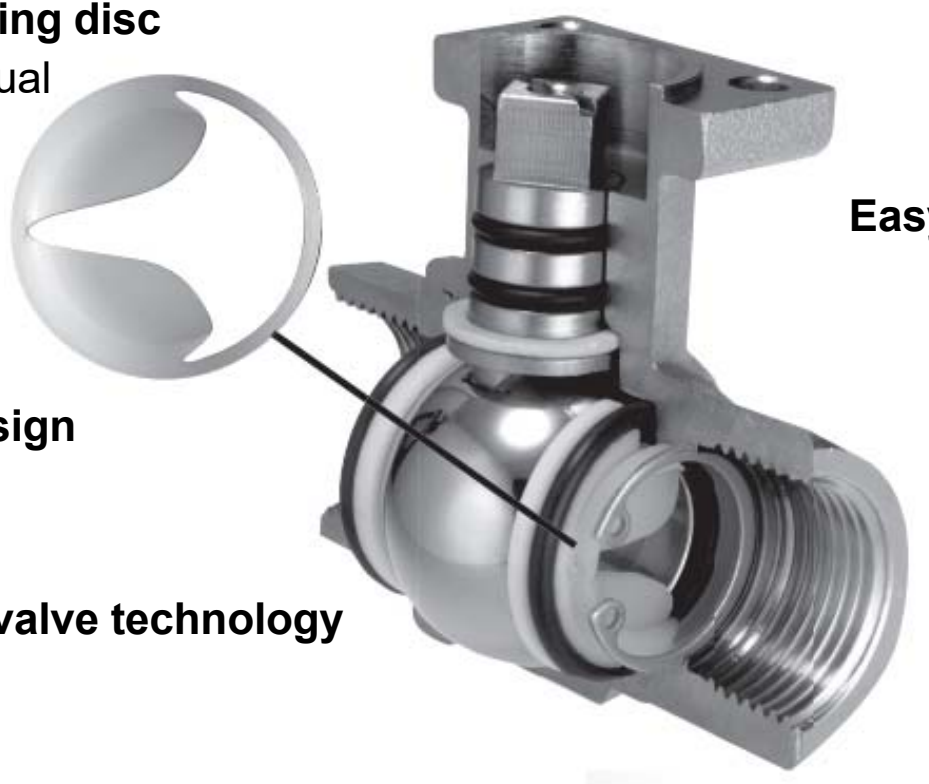
Characterized Control Valve Applications

Control valves are suitable for use in a hydronic system with variable flow.

- Air handling units on heating or cooling coils
- Fan unit heating or cooling coils
- Unit ventilators
- VAV box re-heat coils and bypass loops

Characterized Control Valve (CCV) Technology

Patented characterizing disc
that ensures a true equal percentage flow characteristic



Easy Installation

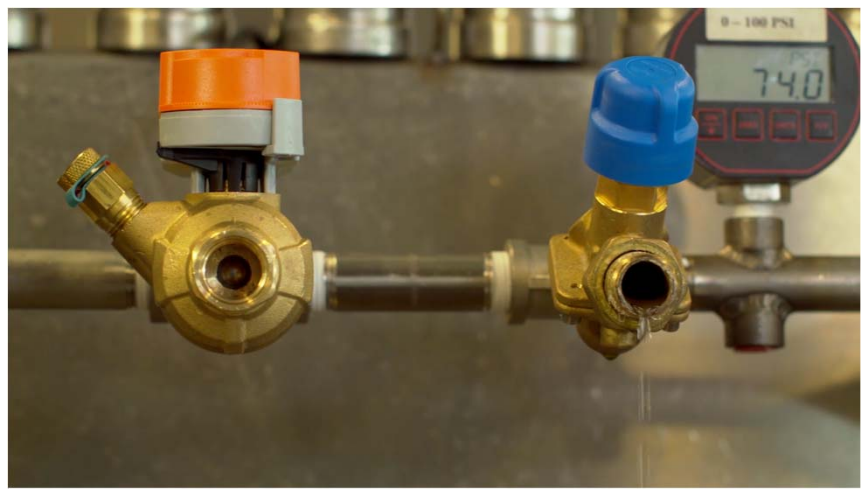
Maintenance-free design

Ball valve technology

0% leakage
preventing ghost energy

What is Ghost Energy?

- Leaky control valves increase the call for additional chilled water or heating water flows creating waste, which is called Ghost Energy. A 1% leakage creates a 5 to 10% energy loss.



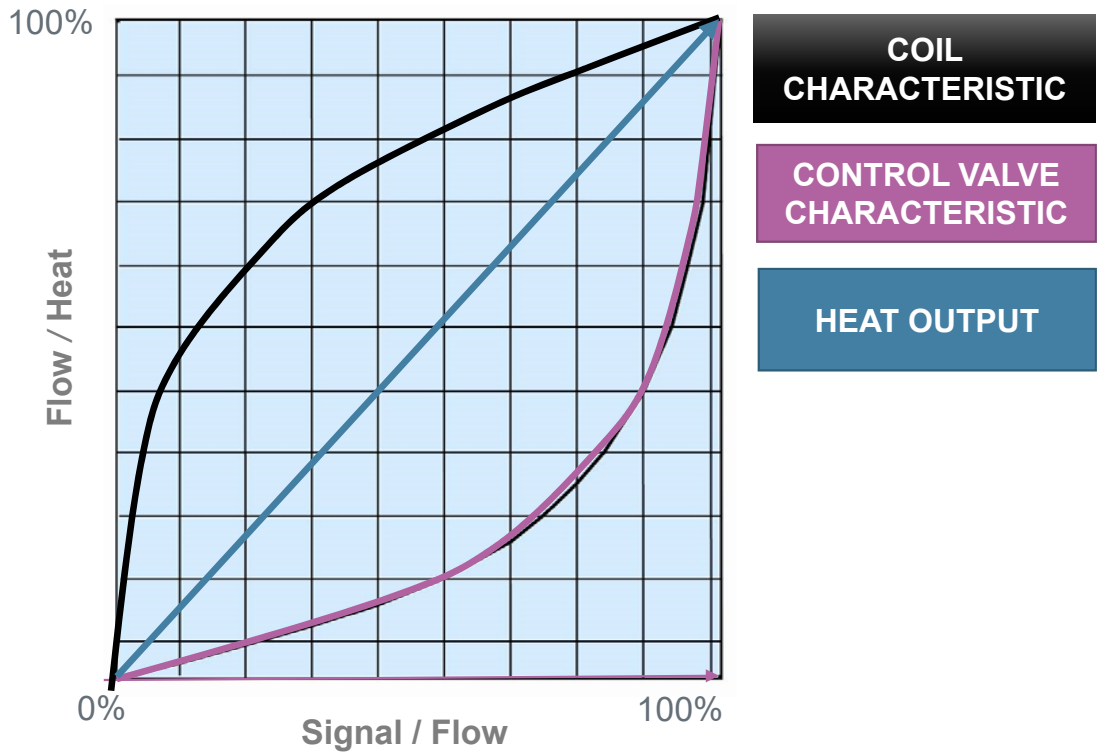
Characterized Control Valve (CCV) Technology

- The characterizing disc defines the change in flow as the ball opens to create a flow characteristic that can be defined as an equal percentage flow curve.

Fully Closed | 20% Open | 50% Open | 80% Open | 100% Open

Flow Configuration
Equal Percentage Flow Characteristic

- The equal percentage flow characteristic of the valve is the inverse of the coil flow characteristic
- The combination of these two characteristic results in a linear output (relationship between ball opening and heat energy) which allows for a proportional response



Characterized Control Valve Selection Criteria

- Media Type (chilled/hot water or steam)
- Pattern (2-way, 3-way or 6-way)
- Valve Size (1/2” to 6”)
- Piping reduction factor (Fp –if Applicable)
- Cv Range – Coefficient of Flow
- Control Type (Open/Close, Floating Point, Modulating)

Media Types

Chilled or Hot Water

Steam

Valve Configurations

- 2-Way
  Isolation & Proportional
- 3-Way
  Mixing & Diverting/Switching
- 6-Way
  Dual Temp Systems

Cv - Piping Reduction Factor (Fp) Correction Factor

	VALVE SIZE				LINE SIZE												
	Model #	Inches	DN [mm]	Cv Rating	½"	¾"	1"	1¼"	1½"	2"	2½"	3"	4"	5"	6"	8"	10"
CCV (Threaded)	B216*	½	15	16	**16**	9	7.2	6.6	-	-	-	-	-	-	-	-	-
	B221*	¾	20	24	-	**24**	19	16	14.5	-	-	-	-	-	-	-	-
	B225*	1	25	30	-	-	**30**	27.4	24.8	22	-	-	-	-	-	-	-
	B230*	1¼	32	19	-	-	-	**19**	18.8	18.2	17.8	-	-	-	-	-	-
	B232*	1¼	32	37	-	-	-	**37**	35.5	31.8	29.9	-	-	-	-	-	-
	B240*	1½	40	37	-	-	-	-	**37**	35.5	34	33	-	-	-	-	-
	B250*	2	50	57	-	-	-	-	-	**57**	55.8	54.2	52.2	-	-	-	-
	B251	2	50	65	-	-	-	-	-	**65**	63.2	60.9	58.1	-	-	-	-
	B252	2	50	85	-	-	-	-	-	**85**	81.1	76.5	71.1	-	-	-	-
	B253	2	50	120	-	-	-	-	-	**120**	109.7	99	88.1	-	-	-	-
	B254*	2	50	240	-	-	-	-	-	**240**	179.6	141.6	114.2	-	-	-	-
	B261	2½	65	60	-	-	-	-	-	-	**60**	59.6	58.3	57.5	-	-	-
	B262	2½	65	75	-	-	-	-	-	-	**75**	74.2	71.8	70.4	-	-	-
	B263	2½	65	110	-	-	-	-	-	-	**110**	107.4	100.7	96.7	-	-	-
	B264	2½	65	150	-	-	-	-	-	-	**150**	143.6	128.6	120.6	-	-	-
	B265*	2½	65	210	-	-	-	-	-	-	**210**	193.5	160.8	145.9	-	-	-
	B277	3	80	70	-	-	-	-	-	-	-	**70**	69.3	68.6	68.1	-	-
	B278	3	80	130	-	-	-	-	-	-	-	**130**	125.8	121.5	118.8	-	-
	B280*	3	80	170	-	-	-	-	-	-	-	**170**	161	152.3	147	-	-
LGCCV (Flanged) ANSI 125	B6250S-070	2½	65	70	-	-	-	-	-	-	**70**	69.3	67.4	66.2	-	-	-
	B6250S-110	2½	65	110	-	-	-	-	-	-	**110**	107.4	100.7	96.7	-	-	-
	B6300S-110	3	80	110	-	-	-	-	-	-	-	**110**	107.4	104.7	103	-	-
	B6400S-186	4	100	186	-	-	-	-	-	-	-	-	**186**	183.3	179.8	175.1	-
	B6500S-290	5	125	290	-	-	-	-	-	-	-	-	-	**290**	287	278.5	273.1
	B6600S-400	6	150	400	-	-	-	-	-	-	-	-	-	-	**400**	392.3	384
LGCCV (Flanged) ANSI 250	B6250S-070-250	2½	65	70	-	-	-	-	-	-	**70**	69.3	67.4	66.2	-	-	-
	B6250S-110-250	2½	65	110	-	-	-	-	-	-	**110**	107.4	100.7	96.7	-	-	-
	B6300S-110-250	3	80	110	-	-	-	-	-	-	-	**110**	107.4	104.7	103	-	-
	B6400S-186-250	4	100	186	-	-	-	-	-	-	-	-	**186**	183.3	179.8	175.1	-
	B6500S-290-250	5	125	290	-	-	-	-	-	-	-	-	-	**290**	287	278.5	273.1
	B6600S-400-250	6	150	400	-	-	-	-	-	-	-	-	-	-	**400**	392.3	384

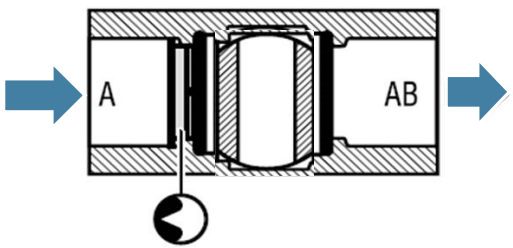
* Models without characterizing discs.

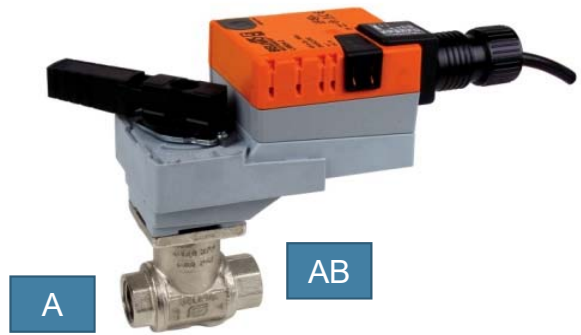
NOTE: Please use the corrected Cv values for the valves listed in the chart when installing them in pipes larger than the line size of the valve. All CCVs not listed do not require piping reduction factors. The values shown in bold are based on test data. All other values are calculated.

- Values in chart are corrected Cv ratings for indicated pipe size

2-Way Operation

2 ports → An inlet port (A) and an outlet port (AB)



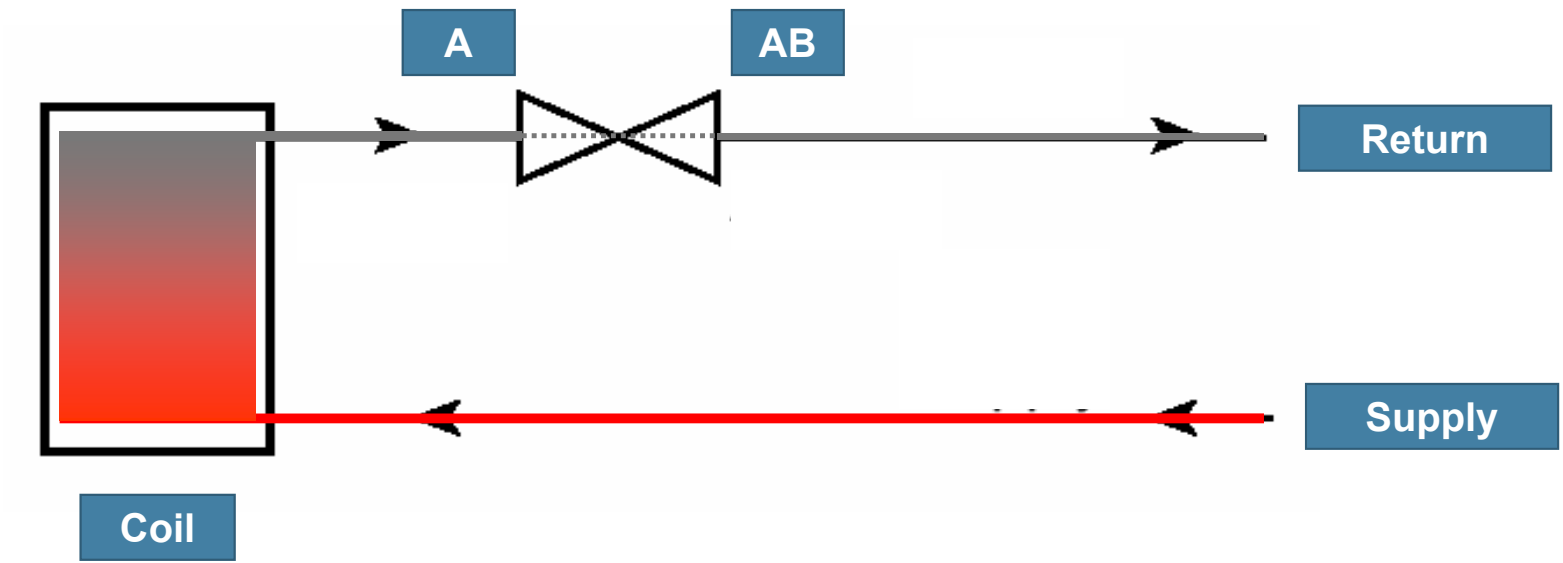


Valve has a drilled hole through the middle → When the hole is in line with the inlet and outlet ports, flow will occur.

To open valve and allow flow → Ball is rotated (CCW)—the opening is in line with both A and AB ports

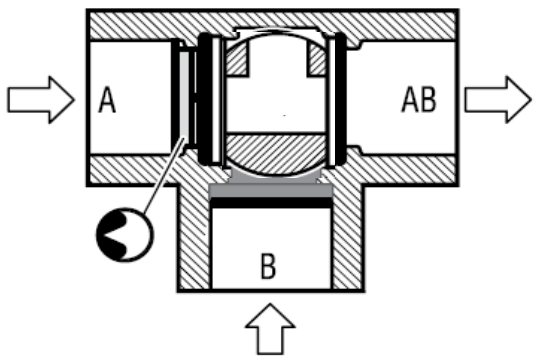
To close valve and stop flow → Ball is rotated 90º (CW)—the opening is perpendicular to A and AB ports

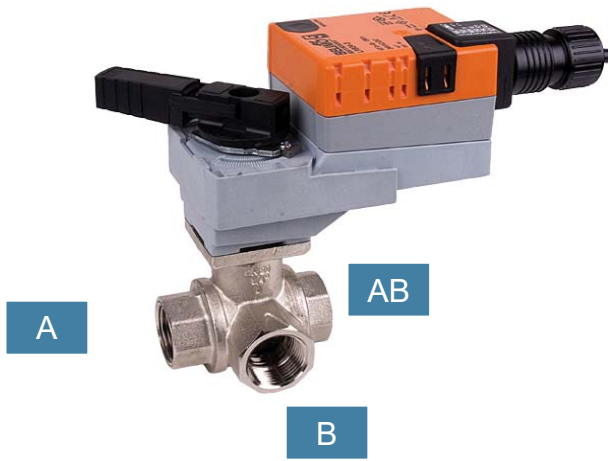
2-Way Valve in Return Piping
2 Position or Proportional Control



3-Way Mixing

3 ports → Two inlet ports (A and B) and one outlet port (AB)



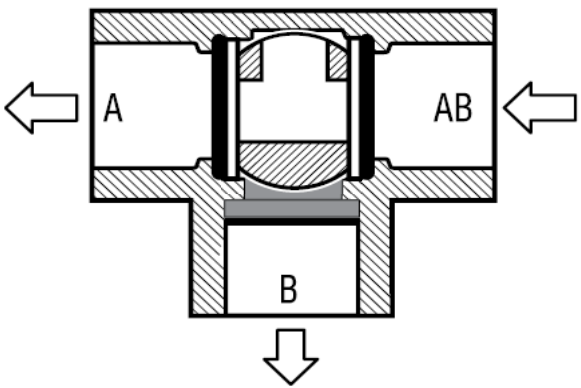


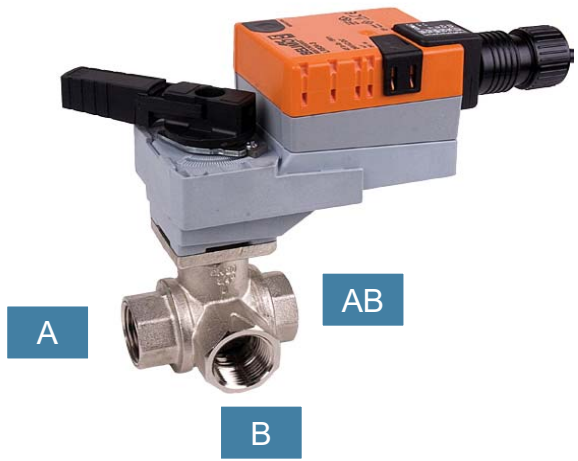
Rotate 90˚ (CW) to allow flow from B to AB → Cv is 70% in the bypass

Rotate 90˚ (CCW) to resume flow from A to AB → Cv is 100% to the coil

3-Way Diverting

Have 3 ports → One inlet port (AB) and two outlet ports (A and B)



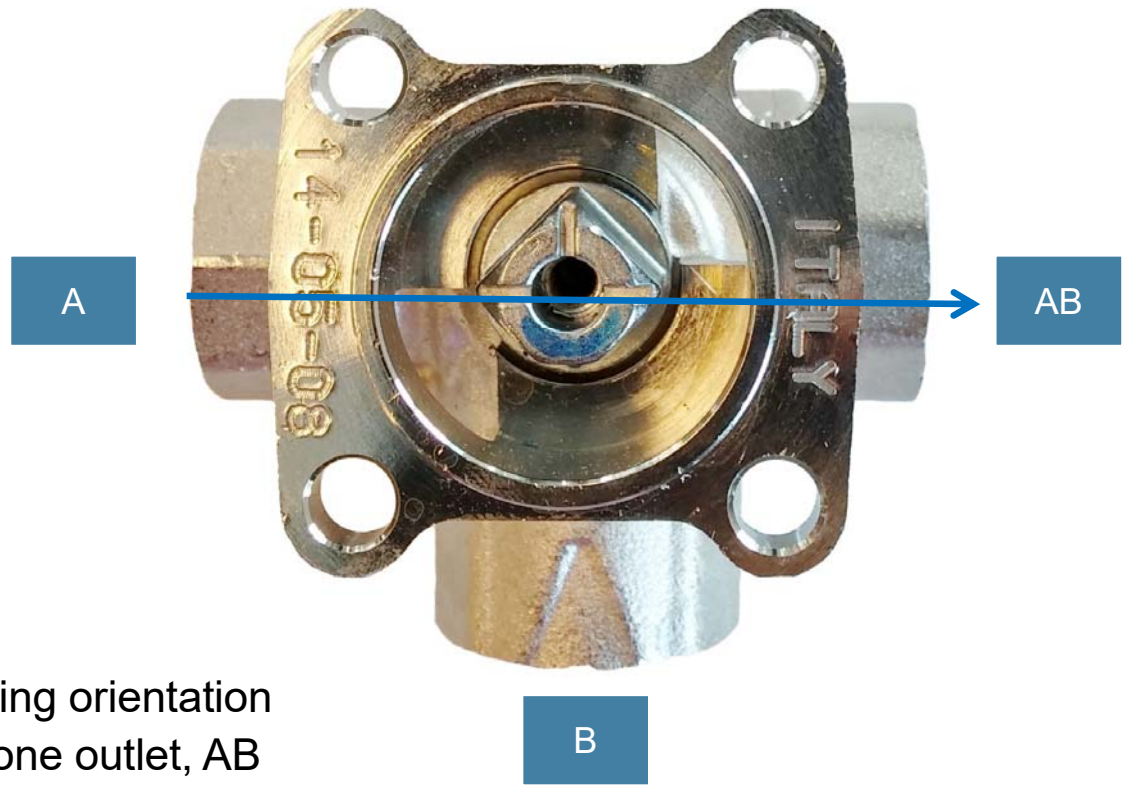


Rotate 90˚ (CW) to allow flow from AB to B →Cv is 70%

Rotate 90˚ (CCW) to resume flow from AB to A → Cv is 100%

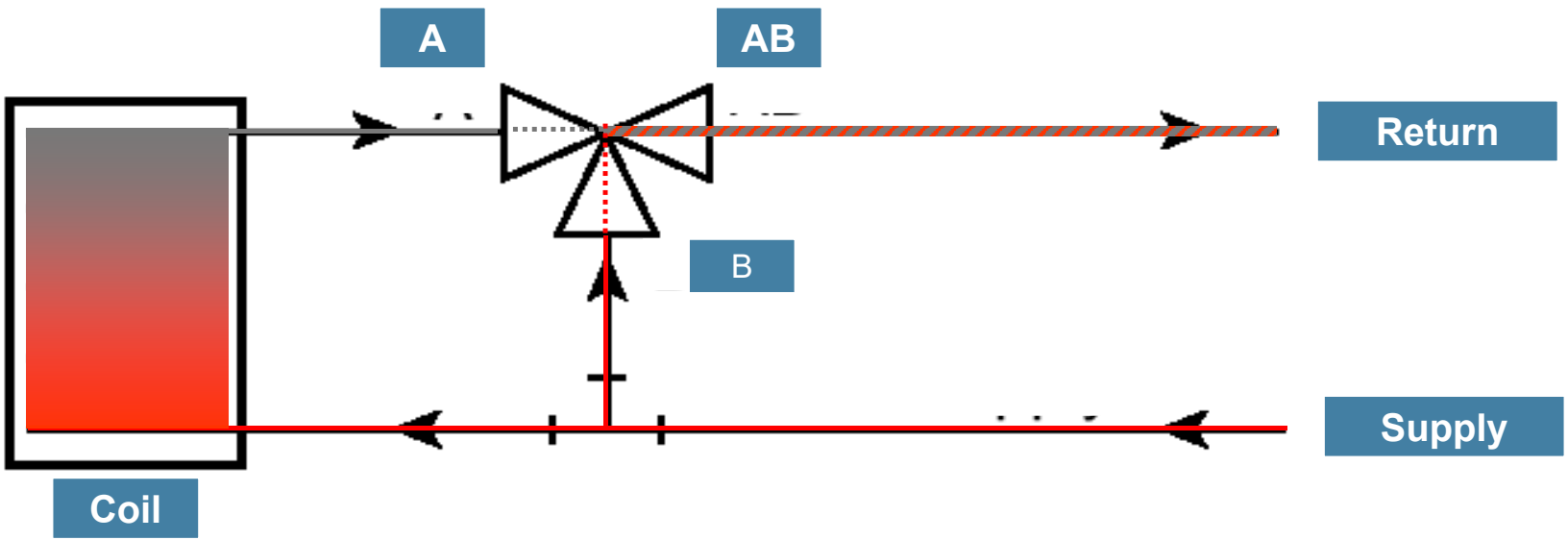
Stem Marking and Flow Direction

Stem markings show flow through the valve (A to AB flow shown)

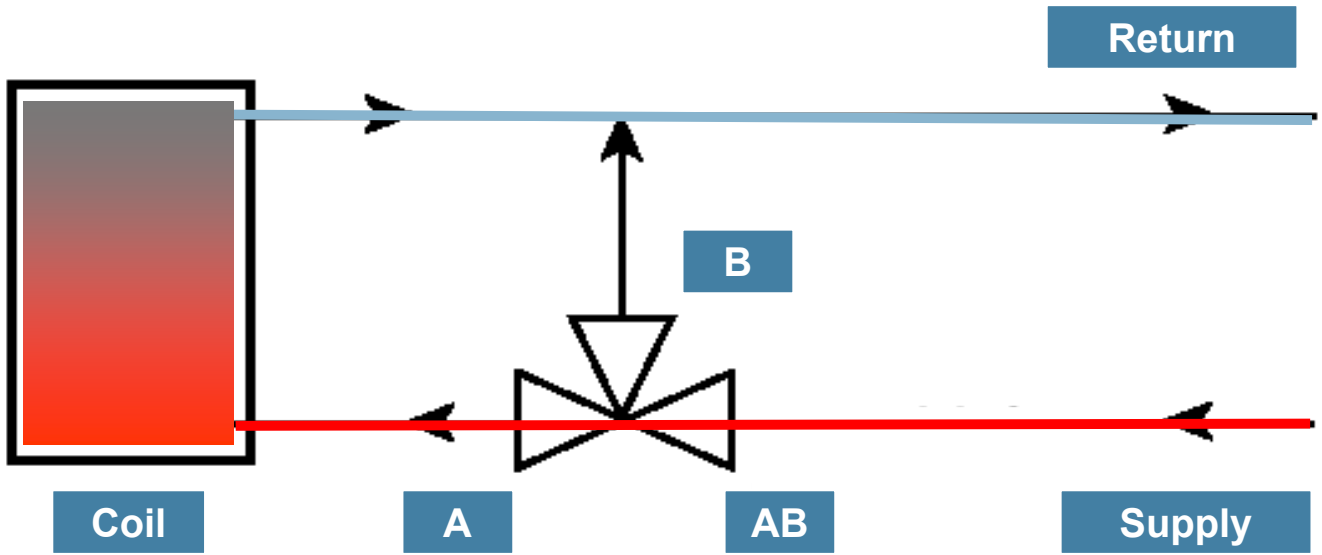


Flow arrows show mixing orientation
2 inlets, A and B, and one outlet, AB

Mixing
2 Inputs – 1 Output



Diverting
1 Input – 2 Outputs Coil Supply



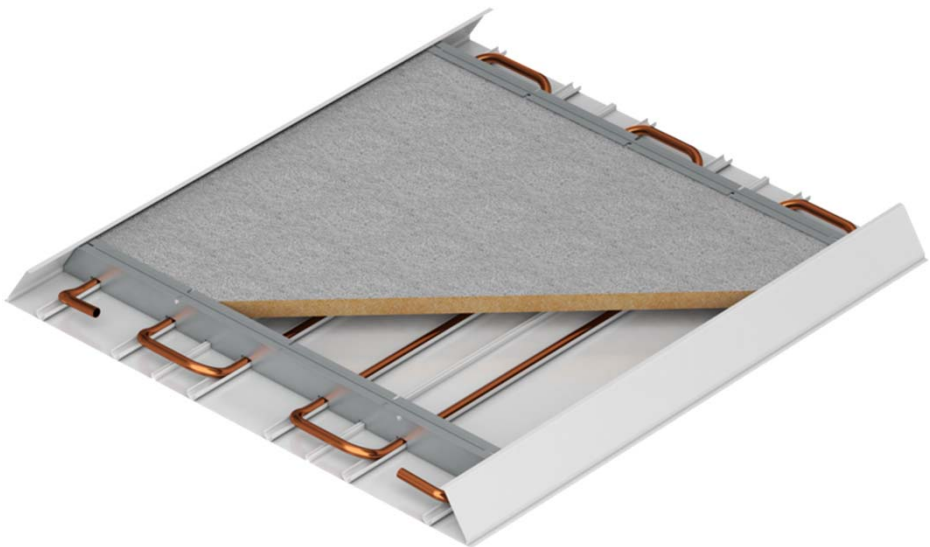
Actuator Type

Fail-safe actuators utilize an internal spring that drives the actuator open or closed on loss of power. **Non fail-safe actuators** stay in their current position on loss of power.

6-Way CCV

6-Way CCV Application

- Chilled beam systems
- Radiant ceiling panels
- Radiant heating/cooling applications

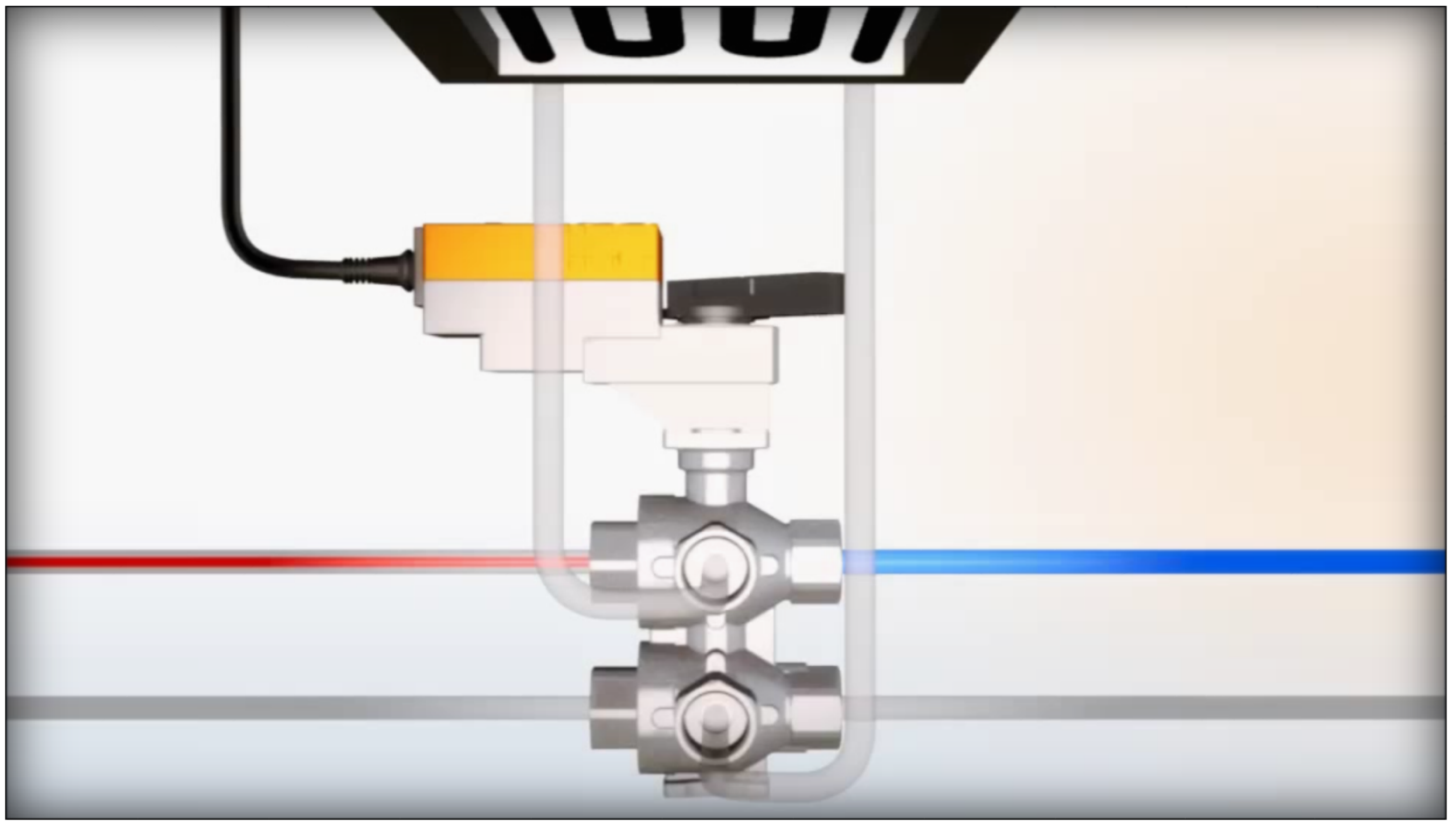


6-Way CCV

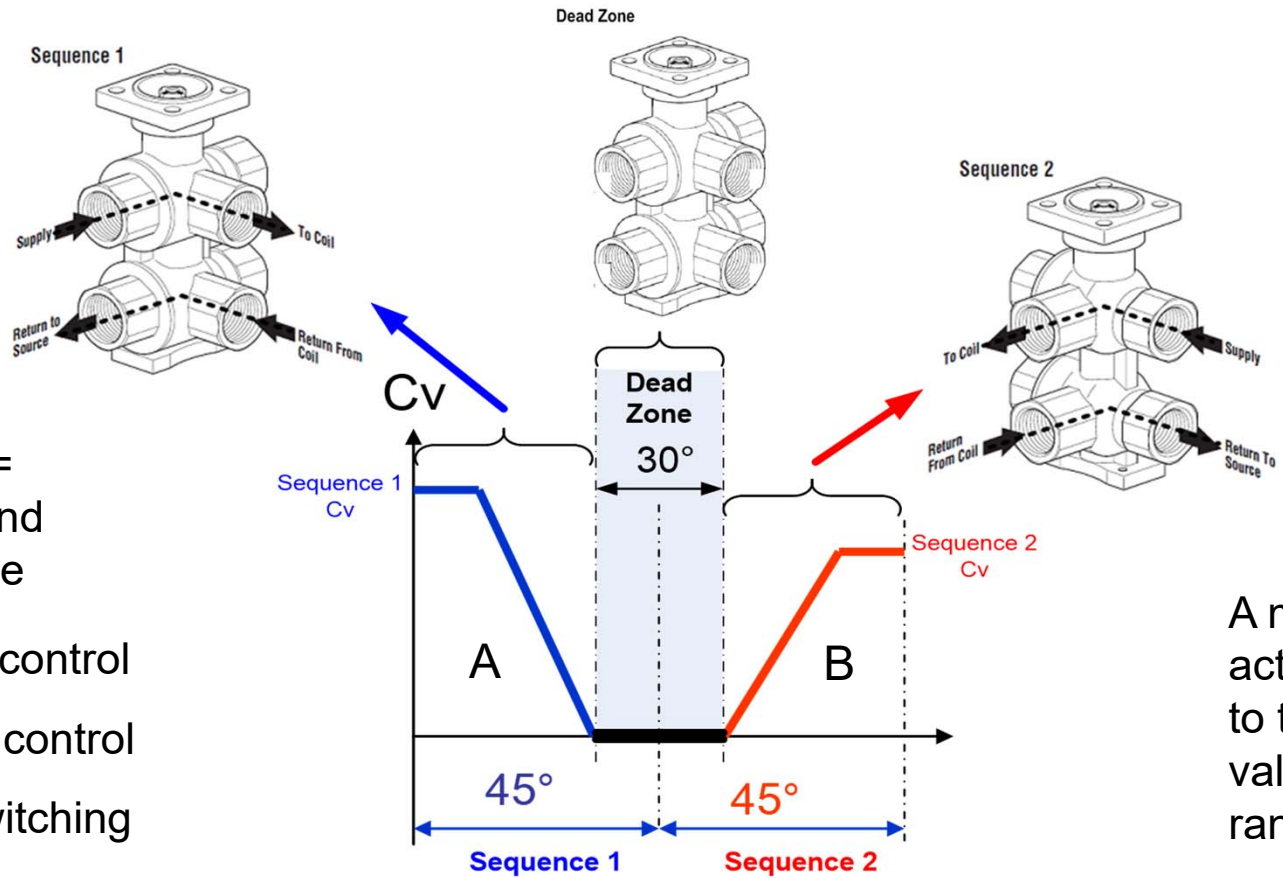
The 6-way CCV is a rotary valve similar to a CCV but with 2 control sequences.

- Sequence operating ranges
- Sequence¹: 0º to 30º rotation
- Closed position 30º to 60º
- Sequence²: 60º to 90º

6-Way CCV Operation



6-way CCV Operation



One valve = switching and control valve

A = Cooling control

B = Heating control

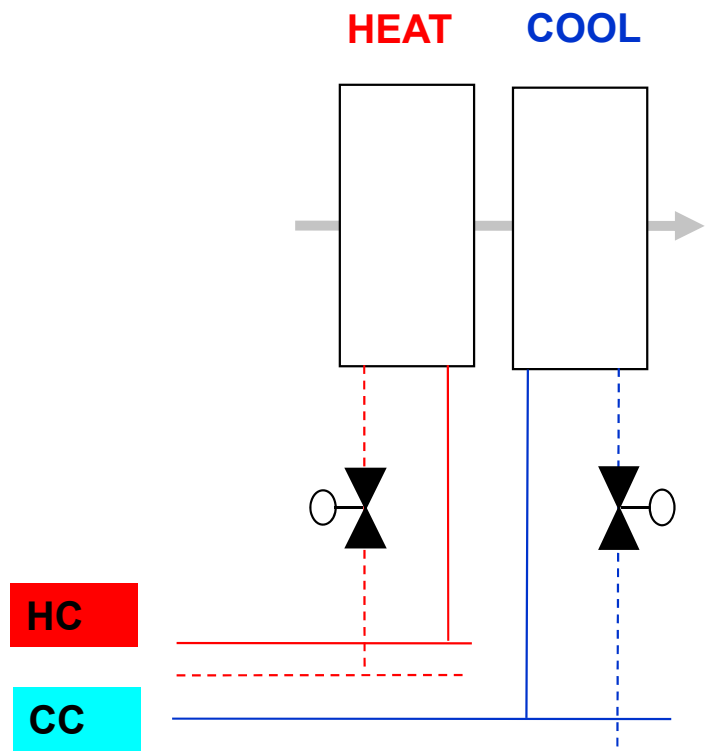
A ⟺ B = switching

A modulating actuator is used to throttle the valve over it's range

Typical Heating/Cooling Application
Terminal Unit (4 pipe), 2-way Valves and 2 Coils

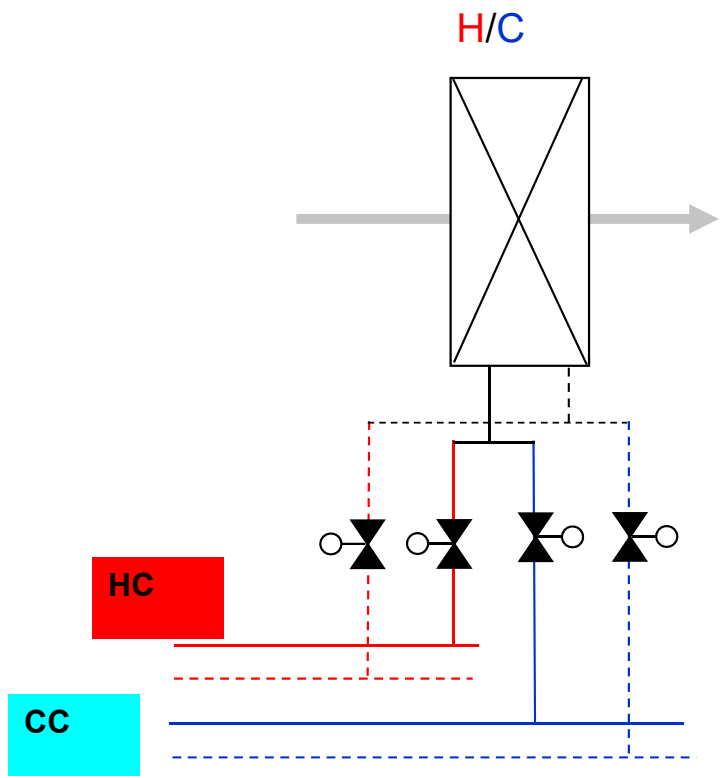
- **Pro**
  - Two exchangers (1 coil for heating and 1 for cooling)
- **Con**
  - Cost exchanger (cost of 2 coils)
  - Two control sequences

Cost of 2 control valves
+ cost of 2 actuators
+ cost of 2 points to control
= $$$



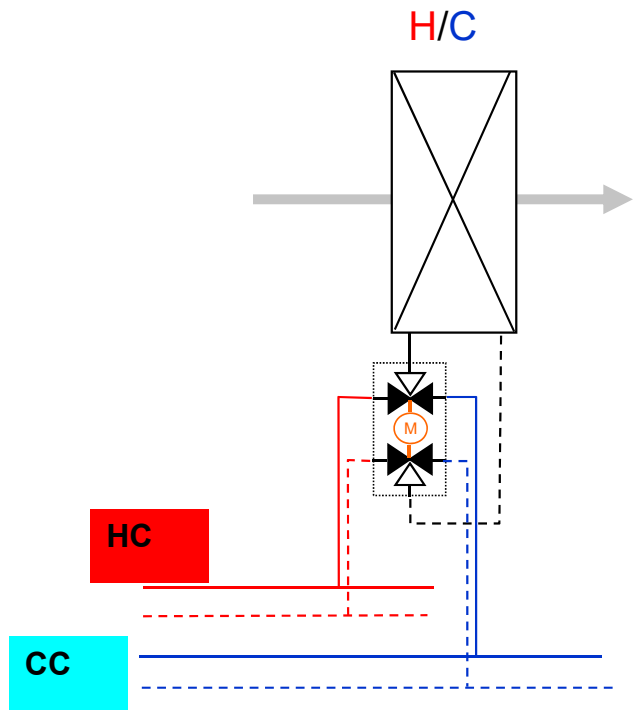
Typical Heating/Cooling Application
Terminal Unit (4 pipe), (4) 2-way Valves and 1 Coils

- **Pro**
  Optimize exchanger (1 coil for heating and cooling)
- **Con**
  - Costs multiple valves (cost of 4 control valves)
  - Two control sequences (cost of 2 control sequences and 4 actuators)



Typical Heating/Cooling Application
Terminal Unit (4 pipe), (1) 6-way Valves and 1 Coils

- **Pro**
  - Optimize exchanger (1 coil for heating and cooling)
  - Low installation cost 1 valve to install
    One control point need to sequence heating and cooling
  - Unit cost of one valve



Further Questions or to Order

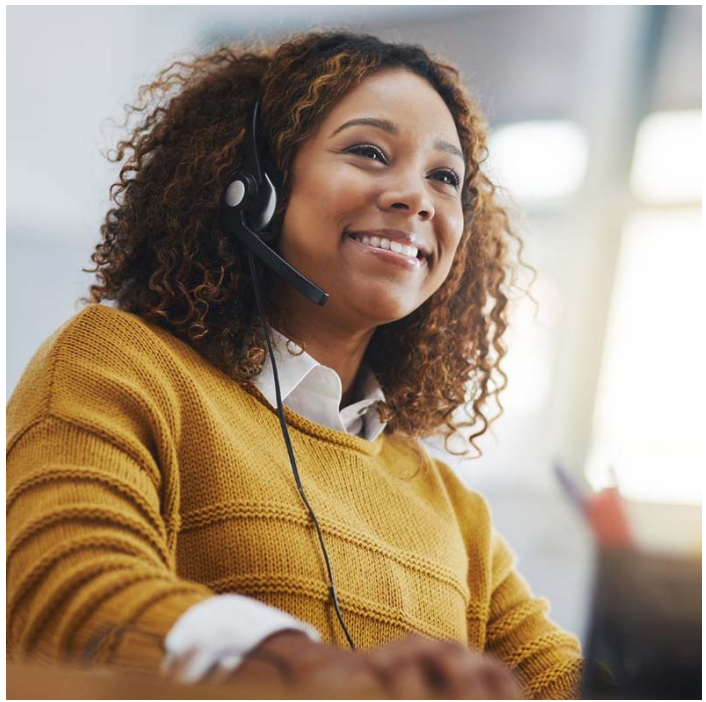
USA
33 Turner Road, Danbury, CT 06810
Tel. 800-543-9038 | Fax. 800-228-8283

1049 Fortunato Loop, Sparks, NV 89436

Canada
5845 Kennedy Road, Mississauga, Ontario L4Z 2G3
Tel. 866-805-7089 | Fax. 905-712-3124

Latin America and the Caribbean
Tel. 203-791-8396 | Fax. 203-791-9139

Brazil
Rua Barbalha, 251, Alto da Lapa, São Paulo - CEP: 05083-020
Tel. 55 11 3643-5656 | Fax. 55 11 3643 5657

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