

In-floor Active Chilled Beam Controls Guide

This guide is provided to assist in explaining the designed operation and control system utilized in the In-floor Active Chilled Beam. A typical zone installation will utilize a series of chilled beam units (up to 10 air valves) connected to a single control box, thermostat, and associated wiring and equipment. This document is organized to describe the function of the device at the full range of input conditions possible for each given configuration.

Please Help Us Improve This Manual

We are very interested to hear any comments or concerns regarding the In-floor Chilled Beam. We are particularly interested in learning of omissions or subjects that are unclear please call, fax, or e-mail. Thank you.

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Definitions

Component	Operation	Signal	Condition
Aquastat¹:	Cold	> 10Kohm	Water Cold (< 77°±10°F)
	Hot	< 10Kohm	Water Hot (> 77°±10°F)
Thermostat:	Cooling Demand	0 – 10 V	Room temp < 2°F above Cool Set Point
	Heating Demand	0 – 10 V	Room temp < 2°F below Heat Set Point
	2nd Stage Heat Demand	10 V	Room temp > 2°F below Heat Set Point
	Cool Set Point	n/a	Thermostat Adjustable
	Heat Set Point	n/a	Thermostat Adjustable
	Dead Band	n/a	Field Adjustable: 2 to 5°F (Distance between Heat and Cool Set Points)
Water Valve:	Open	10 V	-
	Modulate	0 – 10 V	Refer to Water Valve Modulation on Page 6
	Closed	0 V	-
Air Valves:	Open	10 V	-
	Modulate ²	0 – 10 V	Refer to Air Valve Modulation on Page 5
	Closed	0 V	-
Electric Heater:	Full heat	10 V	-
	Modulate	0 – 10 V	Refer to Electric Heater Modulation on page 5
	Off	0 V	-
Condensate Sensor:	Open	No Alarm	No Condensate Detected
	Closed	Alarm	Condensate Detected at the Collection Area

¹Changeover- Sensor- 10Kohm Type 2 Thermistor

2 Pipe Operation

Cooling:

- Water Valve: **Open**
- Air Valves: **Modulate**

Suspend:

- Water Valve: **Closed**
- Air Valves: **Closed**

Heating:

- Water Valve: **Modulate**
- Air Valves: **Closed**

		Aqua Stat	
		Cold	Hot
Thermostat	Cooling Demand (0-10 V)	Cooling	Air Only
	Heating Demand (0-10 V)	Suspend	Heating
	Superheat Demand (10 V)	Suspend	2nd Stage Heat
	Dead Band	Suspend	Suspend
	Condensate Detection	Air Only	n/a

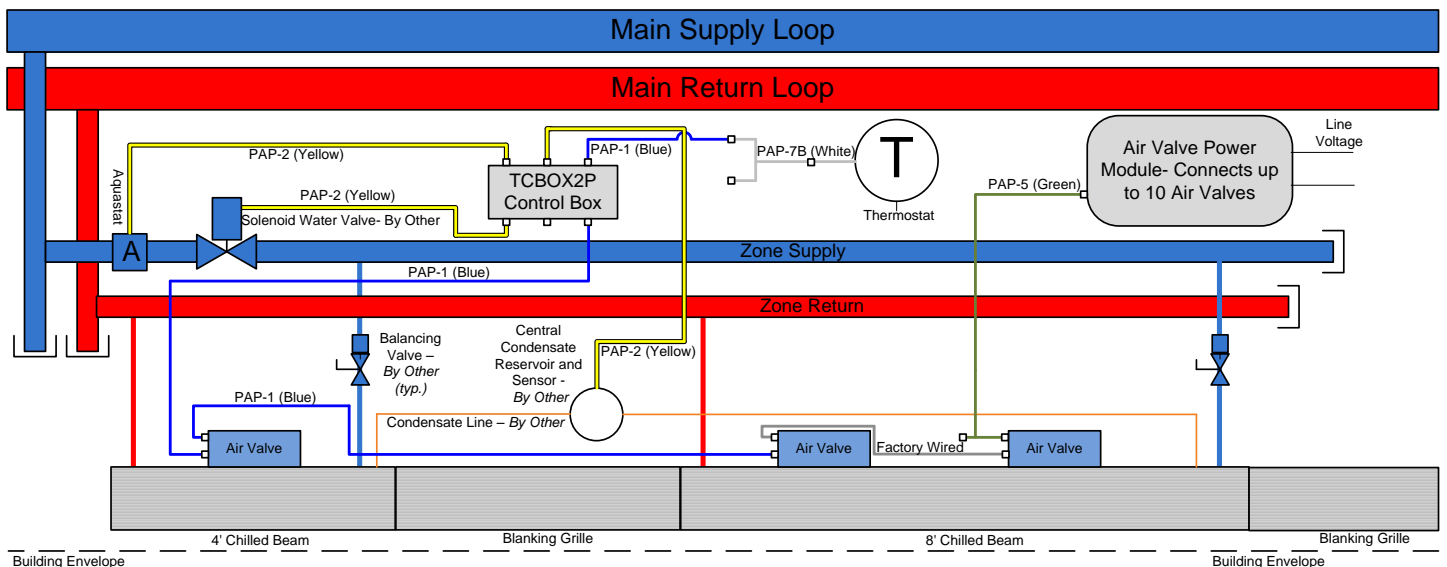
2nd Stage Heat:

- Water Valve: **Open**
- Air Valves: **Modulate**

Air Only:

- Water Valve: **Closed**
- Air Valves: **Modulate**

Schematic:



4 Pipe Operation

Cooling:

- Hot Water Valve: **Closed**
- Cold Water Valve: **Open**
- Air Valves: **Modulate**

Suspend:

- Hot Water Valve: **Closed**
- Cold Water Valve: **Closed**
- Air Valves: **Closed**

Heating:

- Hot Water Valve: **Modulate**
- Cold Water Valve: **Closed**
- Air Valves: **Closed**

Thermostat	Cooling Demand (0-10 V)	Cooling
	Heating Demand (0-10 V)	Heating
	Superheat Demand (10 V)	2nd Stage Heat
	Dead Band	Suspend
	Condensate Detection	Air Only

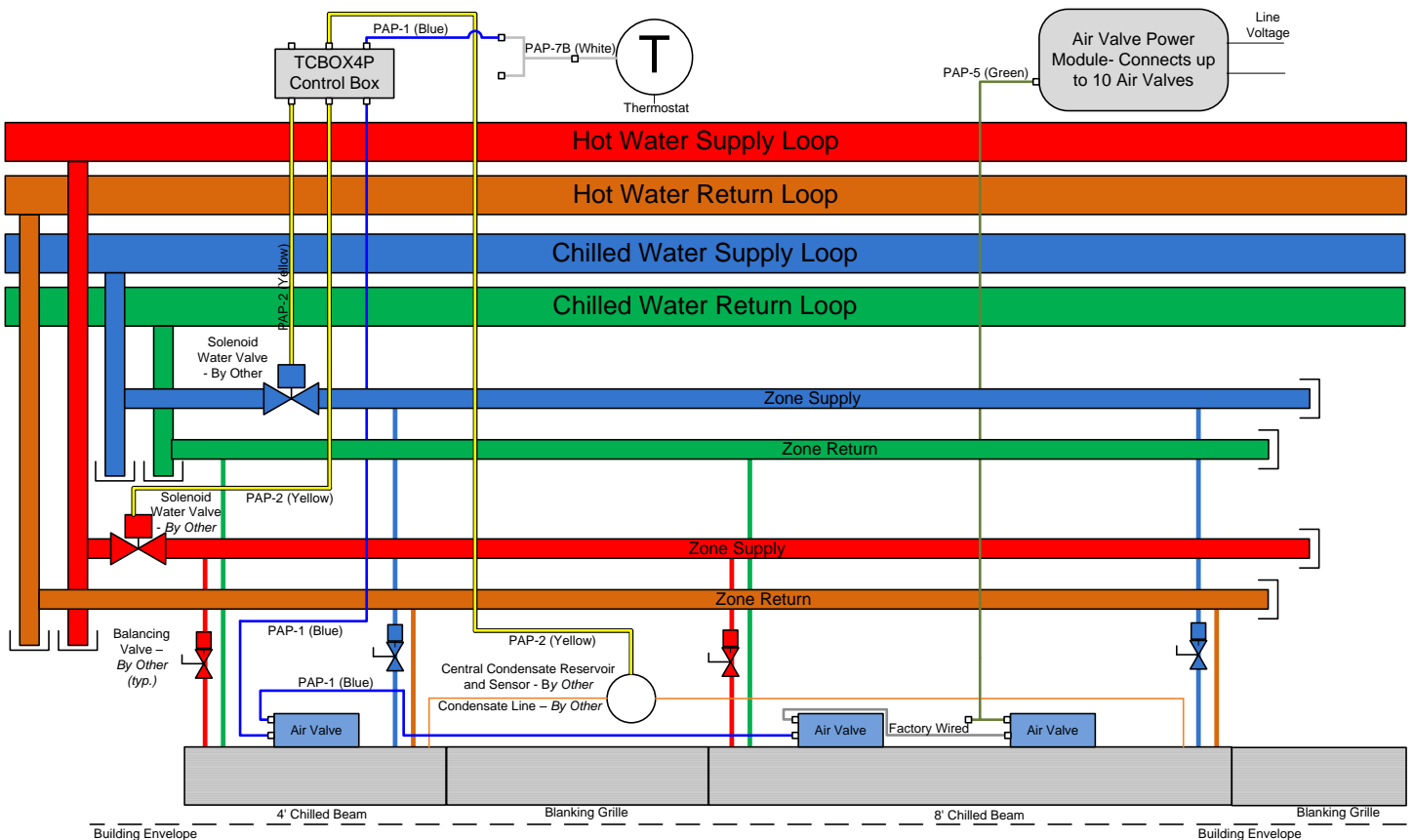
2nd Stage Heat:

- Hot Water Valve: **Open**
- Cold Water Valve: **Closed**
- Air Valves: **Modulate**

Air Only:

- Hot Water Valve: **Closed**
- Cold Water Valve: **Closed**
- Air Valves: **Modulate**

Schematic:



2 Pipe with Electric Heat Operation

Cooling:

- Water Valve: **Open**
- Air Valve: **Modulate**
- Electric Heat: **Off**

Suspend:

- Water Valve: **Closed**
- Air Valve: **Closed**
- Electric Heat: **Off**

Heating:

- Water Valve: **Closed**
- Air Valve: **Closed**
- Electric Heat: **Modulate**

Thermostat	<i>Cooling Demand (0-10 V)</i>	Cooling
	<i>Heating Demand(0-10 V)</i>	Heating
	<i>Superheat Demand (10 V)</i>	2nd Stage Heat
	<i>Dead Band</i>	Suspend
	<i>Condensate Detection</i>	Air Only

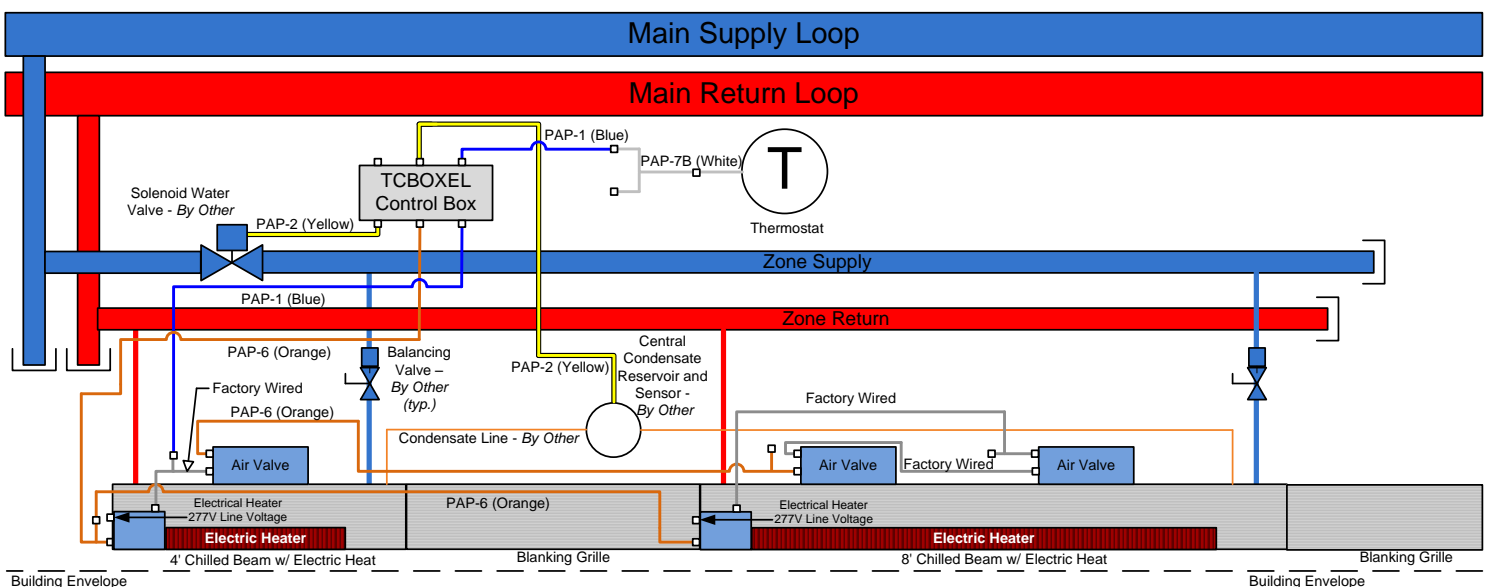
2nd Stage Heat:

- Water Valve: **Closed**
- Air Valve: **Modulate**
- Electric Heat: **Full Heat**

Air Only:

- Water Valve: **Closed**
- Air Valves: **Modulate**
- Electric Heat: **Off**

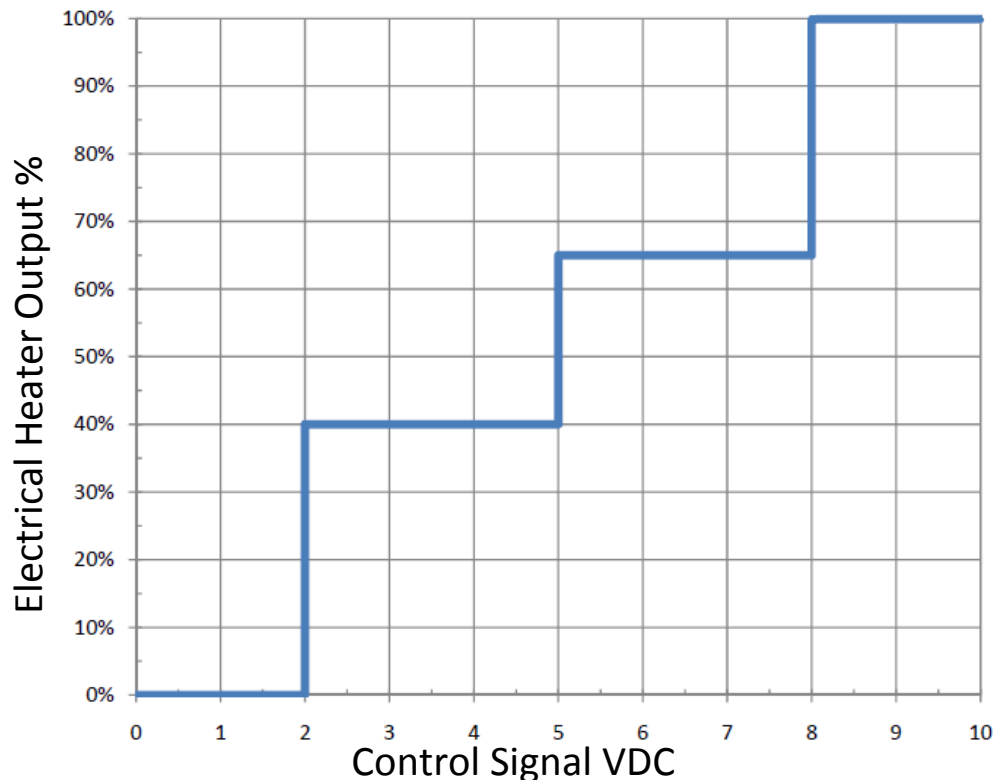
Schematic:



Air Valve Modulation

Step	Open Time (s.)	Close Time (s.)	Total Time (s.)	Control Signal Range VDC	Duty Cycle
1	6	294	300	0.0 – 0.5	2%
2	6	114	120	0.5 – 1.0	5%
3	6	54	60	1.0 – 1.5	10%
4	6	34	40	1.5 – 2.0	15%
5	6	24	30	2.0 – 2.5	20%
6	6	18	24	2.5 – 3.0	25%
7	6	14	20	3.0 – 3.5	30%
8	6	11	17	3.5 – 4.0	35%
9	6	9	15	4.0 – 4.5	40%
10	6	7	13	4.5 – 5.0	46%
11	6	6	12	5.0 – 5.5	50%
12	7	6	13	5.5 – 6.0	54%
13	9	6	15	6.0 – 6.5	60%
14	11	6	17	6.5 – 7.0	65%
15	14	6	20	7.0 – 7.5	70%
16	18	6	24	7.5 – 8.0	75%
17	24	6	30	8.0 – 8.5	80%
18	34	6	40	8.5 – 9.0	85%
19	54	6	60	9.0 – 9.5	90%
20	114	6	120	9.5 – 10.0	95%

Electric Heater Modulation



Water Valve Modulation

