

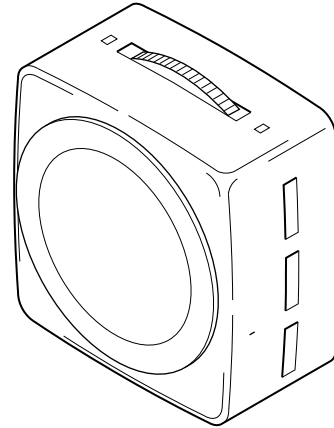
**Summer-Winter  
Pneumatic Two Pipe Room Thermostats  
Installation Instructions**

**APPLICATION**

The 2218 Series Pneumatic Room Thermostats are designed for proportional control of pneumatic valves and damper actuators in environmental control systems where a dual pressure air main is utilized for seasonal changeover of heating and cooling functions. Their design incorporates a highly sensitive, bimetal, thermostatic element, and a pilot-operated relay with pneumatic feedback for accuracy and stability over the entire operating range.

Indexing the thermostat from summer control (reverse acting) to winter control (direct acting) or vice versa, is accomplished by remotely changing the main air pressure supply from 16 psig (110.2 kPa) (summer) to 25 psig (172.4 kPa) (winter).

These thermostats have a serrated thumb wheel for setpoint adjustment.



**SPECIFICATIONS**

**Action:** Proportional.

**Setpoint Range:** See Model Chart.

**Throttling Range:** See Model Chart.

**Supply Air Pressure:**

**Below 16 psig (110.3 kPa),** Operates at summer setpoint.

**Above 25 psig (172.4 kPa),** Operates at winter setpoint.

**Maximum Air Pressure:** 30 psig (206.8 kPa).

**Main Air Consumption:** See Model Chart.

**Calibration Point:** See Model Chart.

**Summer/Winter Indexing:** Remote, by change in main air pressure.

**Setpoint Adjustment:** Serrated thumbwheel.

**Construction:**

**Mechanical Components,** Die cast aluminum, stainless steel, and glass-filled nylon.

**Diaphragm,** Fabric-reinforced Neoprene.

**Air Lines,** Connect to thermostat nipples with spring-reinforced plastic tubes.

**Branch Connections,** Equipped with internal filters.

**Environment:**

**Humidity:** 5 to 95% relative humidity, non-condensing.

**Accessories**

Part Number	Replaces Model	Description
<b>Accessories</b>		
20-660	6-441	Cover screw
20-707	10-53	Metal thermostat guard
20-715	10-62	Clear thermostat guard
21-876	10-76	Opaque thermostat guard
21-928		Gray plastic cover, blank dial
21-933		Gray plastic cover, °F/°C dial
<b>Calibration</b>		
20-881	N2-4	Calibration wrench
22-138	MCS-GA	Branch tap gauge adaptor
900-002		Thermostat calibration kit
<b>Installation</b>		
10-82-SS		Outlet box mounting plate, stainless steel
20-850	10-82	Outlet box mounting plate, black
20-642		Mounting ring
21-473		Snap-in drywall mounting
22-021		Universal drywall mounting kit
22-022	N5-95	Competitor replacement mounting kit
22-024		Standard mounting kit

## Model Chart — Thermostats

Part Number	Replaces Model	Action	Setpoint Range	Calibration Point	Throttling Range	Air Consumption	Description
2218-132	T32-301	RA @ 16 psig DA @ 25 psig	55 to 85 °F (13 to 29 °C)	12 psig branch line pressure	Adjustable 2 to 12 °F (1 to 7 °C)	31.1 scim @ 16 psig 43.2 scim @ 25 psig	Includes 1/4" by 3/16" barbed couplings, 20-693 tubing, standard mounting plate and screws.
2218-133	T33-301	DA @ 16 psig RA @ 25 psig				29.4 scim @ 16 psig 34.5 scim @ 25 psig	
2218-134	T32-321	RA @ 13 psig DA @ 18 psig				22.5 scim @ 16 psig 34.5 scim @ 25 psig	
2218-301	T34-3011	RA @ 16 psig (summer) DA @ 25 psig (winter)	Winter = 44 to 74 °F (7 to 23 °C) Summer = 76 to 85 °F (24 to 29 °C)	9 psig branch line pressure	Fixed 4 °F (2 °C)	34.6 scim @ 16 psig 51 scim @ 25 psig	

## PIPING DIAGRAM

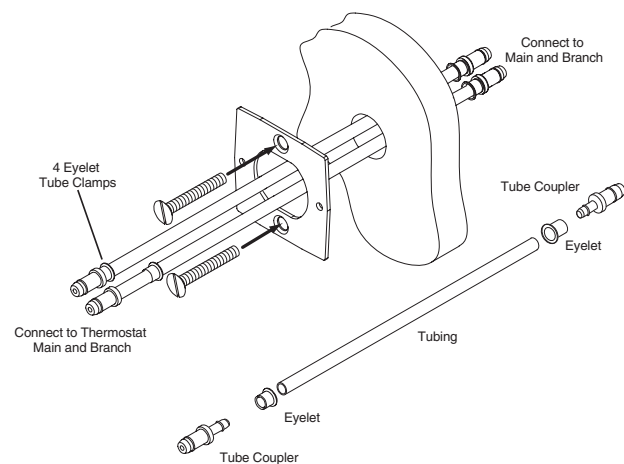
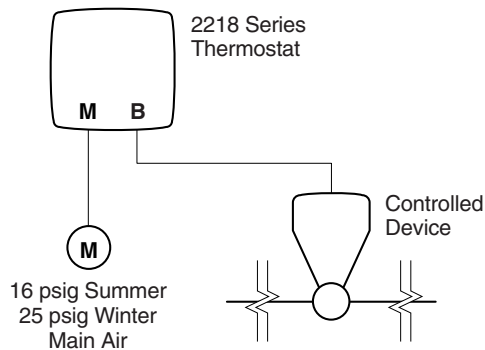


Figure-1

## Location

### Caution:

- Do not locate the thermostat near sources of heat or cold, such as lamps, motors, sunlight, or concealed ducts or pipes. Doing so will affect the accuracy of the thermostat.
- Avoid installing the thermostat on outside walls. Mount thermostats *only after the wall surfaces have been finished*.

Locate the thermostat where it will be exposed to an unrestricted circulation of air, which represents the average temperature of the controlled space.

## Installation

- Tools (not provided):
  - Appropriate screwdriver for mounting the thermostat
  - 20-881 Thermostat calibration and cover screw wrench (or 1/16" and 1/4" hex wrenches)

- Assemble the eyelets and two tube couplers to tubing.
- Connect the assembly by inserting the tube couplers into existing tubing in the wall (Figure-1). Note which connection is Main and which connection is Branch.
- Pull tubing through center hole in mounting plate and screw mounting plate to wall with flat head screws. Cut tubing and insert two couplers. The Main and Branch tubing is connected into the corresponding ports on the thermostat (Figure-1).
- Affix thermostat to mounting ring with round head screws, taking care not to kink the tubing.

## CALIBRATION

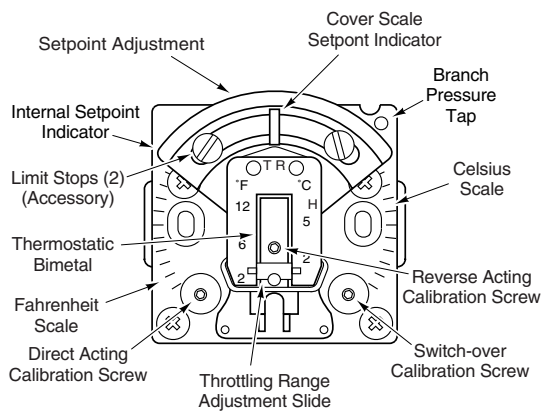
### Calibration of Single Bimetal Models

The 2218 series thermostats are factory calibrated with the throttling range set at 3 °F. They should not require calibration upon installation. However, if the throttling range is changed, or if limited summer control action at 8 psig main air pressure is required, recalibrate the thermostat as follows:

1. Remove the thermostat cover and install a 22-138 branch tap gauge adaptor into the branch pressure tap hole.
2. Measure the ambient temperature with an accurate thermometer. This temperature *must be within the range of the thermostat*. Take care not to breathe on, or place a hand near the bimetals, as this will result in an inaccurate reading.
3. Move the setpoint adjustment to the measured ambient temperature, using the internal setpoint indicator.

### Standard Calibration

1. Taking care not to breathe on, or place the hand near the bimetal, use a 20-881 thermostat wrench (1/16" hex wrench) to turn the reverse acting calibration screw until the branch line pressure indicates 12 psig. Clockwise rotation increases the branch line pressure. Counterclockwise rotation decreases the branch line pressure.
2. Raise the main air pressure to 25 psig.
3. Turn the direct acting calibration screw until the test gauge indicates 12 psig. Clockwise rotation decreases the branch line pressure. Counterclockwise rotation increases the branch line pressure.



### Special Calibration — 8 psig Summer Control

1. Set the main air pressure to 8 psig.
2. Taking care not to breathe on, or place the hand near the bimetal, use a 20-881 thermostat wrench (1/16" hex wrench) to turn the reverse acting calibration screw until the branch line pressure indicates 6 psig. Clockwise rotation increases the branch line pressure. Counterclockwise rotation decreases the branch line pressure.
3. Raise the main air pressure to 25 psig.
4. Turn the direct acting calibration screw until the test gauge indicates 6 psig. Clockwise rotation decreases the branch line pressure. Counterclockwise rotation increases the branch line pressure.

### Switch Over Point Adjustment

If necessary, adjust the switch point as follows:

#### Note:

- The switch point adjustment requires changes to the main air pressure, which could affect other parts of the system. This adjustment should instead be made on a test bench at which a variable main air supply is available.
- Install a test gauge into the branch line, so that this pressure can be measured while making the switch point adjustment.

1. Set the main air pressure to the desired switch over point.
2. Move the setpoint adjustment to its farthest clockwise position.
3. Use a 20-881 thermostat wrench (1/16" hex wrench) to turn the switch over calibration screw, 1/8 turn at a time, until the branch pressure just drops to 0 psig. This sets the switch over point.
4. Recalibrate the thermostat according to the instructions in Standard Calibration or Special Calibration, as applicable.
5. Reinstall the thermostat cover and set the thermostat to the desired setpoint.

### Calibration of 2218-301 Dual Bimetal Models

The 2218-301 thermostat is factory calibrated and should not require calibration upon installation. However, if the summer or winter setpoint requires calibration, or if the switch point needs to be raised or lowered, recalibrate the thermostat as follows:

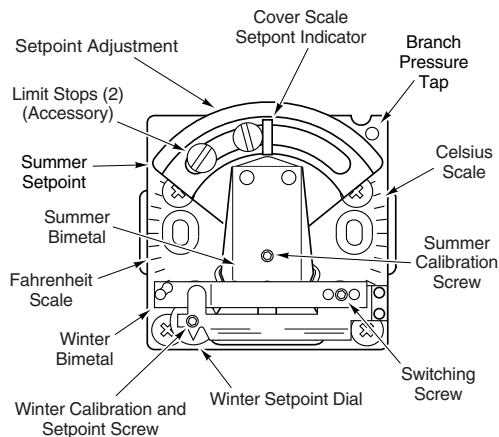
1. Remove the thermostat cover and install a 22-138 branch tap gauge adaptor and a suitable 0 to 30 psig gauge into the branch pressure tap hole.
2. Measure the ambient temperature with an accurate thermometer. This temperature *must be within the range of the thermostat*. Take care not to breathe on, or place a hand near the bimetals, as this will result in an inaccurate reading.

### Summer Setpoint Calibration

1. Position the summer setpoint cam to the measured ambient temperature.
2. Set the main air pressure to 16 psig.
3. Adjust the summer calibration screw, using a 20-881 thermostat wrench (1/16" hex wrench), until the branch tap gauge reads  $9 \pm 1$  psig. Clockwise rotation increases the branch line pressure. Counterclockwise rotation decreases the branch line pressure.

## Winter Setpoint Calibration

1. Increase the main air pressure to 25 psig.
2. Using a 20-881 thermostat wrench (1/16" hex wrench), rotate the winter calibration screw until the branch tap gauge reads  $9 \pm 1$  psig. Clockwise rotation increases the branch line pressure. Counterclockwise rotation decreases the branch line pressure.
3. The winter setpoint is in calibration when the winter setpoint dial indicates the ambient temperature within  $\pm 2$  °F. If not, adjust the winter setpoint as follows:
  - a. Rotate the winter setpoint screw until the dial gently contacts its stop. Clockwise rotation increases the ambient temperature reading, and counterclockwise rotation decreases the ambient temperature reading.
  - b. Continue rotating the setpoint screw approximately 1/8 turn, slipping the screw inside the dial.
  - c. Turn the setpoint screw back and check for  $9 \pm 1$  psig branch air pressure, with the dial indicating the ambient temperature within  $\pm 2$  °F.
  - d. Repeat steps a, b, and c, as necessary, until winter setpoint calibration is obtained.
4. The winter setpoint screw may now be used to position the winter setpoint dial to the desired winter control point.



## Switch Over Point Adjustment

Adjust the switch over point as follows:

### Note:

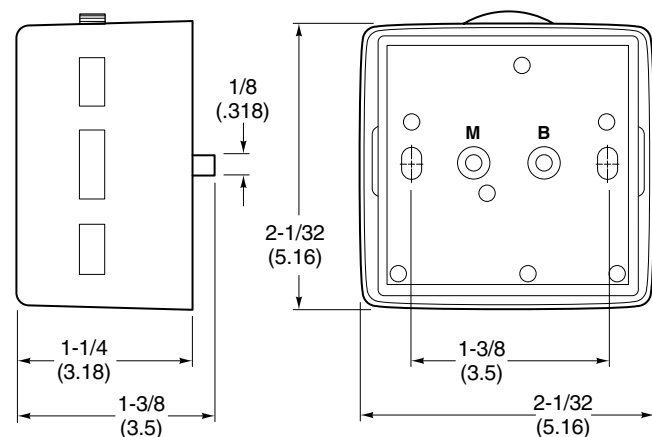
- The switch point adjustment requires changes to the main air pressure, which could affect other parts of the system. This adjustment should instead be made on a test bench at which a variable main air supply is available.
- Install a test gauge into the branch line, so that this pressure can be measured while making the switch point adjustment.

1. Set the main air pressure to 15 psig.
2. Position the summer setpoint dial to 85 °F and the winter setpoint dial to 44 °F.
3. The branch tap gauge should read 15 psig, minimum. If not, recheck the summer setpoint calibration.
4. Slowly increase the main air pressure until the branch tap gauge drops to 0 psig. This is the main air pressure at which the thermostat switches from summer control to winter control.
5. If the main air pressure at the switching point is less than 17 psig or greater than 21 psig, adjust the switching screw as follows, using a 20-881 thermostat wrench (1/16" hex wrench):
  - a. If the switching point is less than 17 psig, turn the switching screw 1/8 turn counterclockwise, to raise the switching point. Raise the main air pressure until the branch tap gauge reading drops to 0 psig (switching point). If the main air pressure at this point is still less than 17 psig, repeat this step, as necessary, until the switching point is obtained.
  - b. If the switching point is greater than 21 psig, turn the switching screw 1/8 turn clockwise, to lower the switching point. Lower the main air pressure until the branch tap gauge reading drops to 0 psig (switching point). If the main air pressure at this point is still greater than 21 psig, repeat this step, as necessary, until the switching point is obtained.

**Caution:** Do not force the calibrating screws. If the desired action is not obtained when the screw is rotated, check to be sure the direction of rotation is correct.

6. Reinstall the thermostat cover and set the thermostat to the desired setpoint.

## DIMENSIONAL DATA



Dimensions are in inches (mm).

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