


## Powers™ Controls

### Calibration Kit for Room and Duct Thermostats

**Product Number** 832-177

**Caution Notation**

<b>CAUTION:</b>		Equipment damage or loss of data may occur if you do not follow procedures as specified.
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**Description**

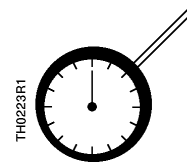
This kit contains the equipment required to test pneumatic room and duct thermostats and pneumatic devices such as valve or damper actuators or positioning relays. Table 1 lists the items contained in the calibration kit.

**Table 1. Calibration Kit Parts List.**

Item	Description	Quantity	Reference
1	Dial thermometer	1	Figure 1
2	Baumanometer	1	Figure 2
3	Dual scale pressure gauge 0 to 30 psi and 0 to 200 kPa	1	Figure 3
4	1/16-inch (1.6 mm) hex Allen wrench	1	Figure 4
5	1/4-inch (6.4 mm) OD plastic tubing, 2-3/4-inch (70 mm) long	2	Figure 5
6	1/4-inch (6.4 mm) OD plastic tubing plug	2	Figure 6
7	1/4-inch (6.4 mm) OD by 1/4-inch (6.4 mm) OD plastic by 1/8-inch (3.2 mm) NPT brass tee	1	Figure 7
8	3/16-inch (4.8 mm) ID rubber tubing, 12 inches (305 mm) long	2	Figure 8
9	Calibration Tool Kit (Part Number 832-178)	1	TB 240

**Dial Thermometer**

The dial thermometer is used to determine the ambient temperature at the thermostat sensing element.



**Figure 1. Dial Thermometer.**

**Baumanometer**

The baumanometer is a squeeze bulb with a restrictor type shut-off valve. It is used if a source of air pressure is not available or if a gradual air pressure change is required to operate a pneumatic device such as a valve or damper actuator.

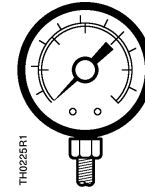


**Figure 2. Baumanometer.**

**Description,  
 Continued**

**Dual Scale Pressure Gauge**

The dual scale pressure gauge has a dual scale of 0 to 30 psi and 0 to 200 kPa, and is bottom-connected. It is used to measure the air pressure being delivered to a pneumatic device or the branch line pressure of a thermostat.



**Figure 3. Dual Scale Pressure Gauge.**

**Hex Allen Wrench**

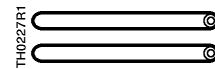
The 1/16 inch hex Allen wrench is used to loosen the cover screws on room thermostats.



**Figure 4. Hex Allen Wrench.**

**1/4-Inch (6.4 mm) OD Plastic Tubing.**

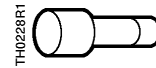
The 1/4-inch (6.4 mm) OD plastic tubing is used to make connections between rubber tubing and barbed fittings.



**Figure 5. 1/4-Inch (6.4 mm) OD Plastic Tubing.**

**Tubing Plug**

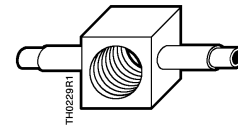
The tubing plug is used to plug pressurized 1/4-inch (6.4 mm) OD plastic tubing air lines that have been disconnected during calibration.



**Figure 6. Tubing Plug.**

**Brass Tee**

The brass tee holds the pressure gauge and connects the baumanometer (Figure 2) to the controlled pneumatic device, or connects the gauge to the thermostat's test port.



**Figure 7. Brass Tee.**

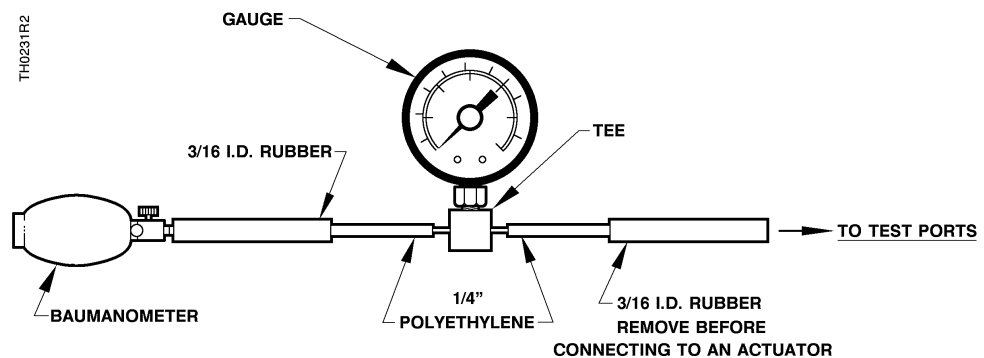
**3/16-inch (4.8 mm) ID Rubber Tubing**

The 3/16-inch (4.8 mm) ID rubber tubing is used to connect the baumanometer (Figure 2) or thermostat test port to the tee holding the gauge.



**Figure 8. 3/16-Inch (4.8 mm) ID Rubber Tubing.**

**Assembly**



**Figure 9. Pressure Gauge Assembly.**



**CAUTION:**

Thermostats must be recalibrated whenever sensitivity is changed.

**Calibration Instructions**

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**TH-180D and TH-180R Single Temperature Room Thermostats**

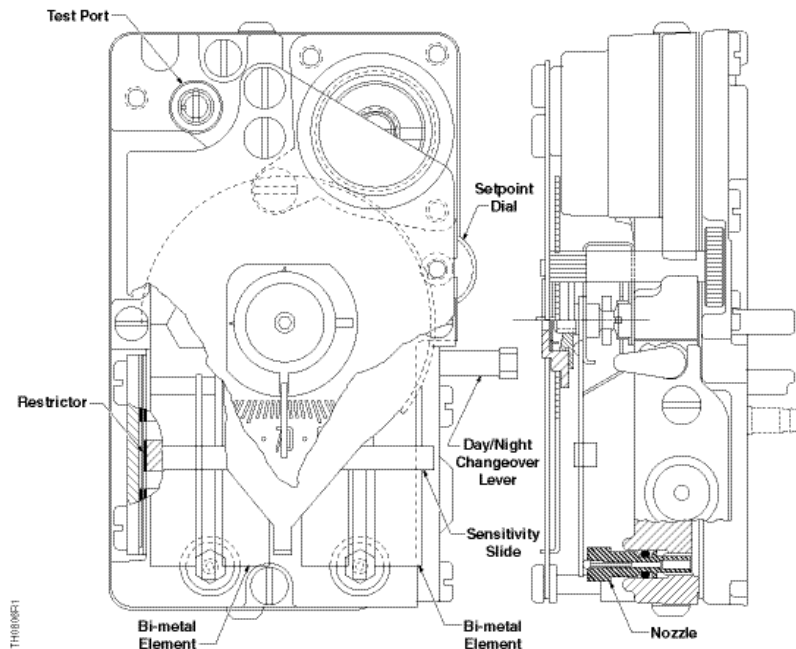
- Small, flat-blade screwdriver (not included)
- Nozzle Wrench
- Cover Screw and Calibration Wrench
- Dial Thermometer
- Pressure Gauge Assembly (see Figure 9)

**Required Tools**

**Thermometer Calibration**

1. Verify that the room temperature is between 70°F and 80°F (21°C and 27°C).
2. Remove cover using the Cover screw and calibration wrench.
3. Invert the cover to expose the bi-metal coil.
4. Place a small, flat-blade screwdriver in the slot located in the center of the bi-metal coil, and carefully rotate until the pointer tip indicates the correct room temperature.

**NOTE:** Do not breathe on or touch the bi-metal coil, to avoid influencing the temperature reading.



**Figure 10. Typical Thermostat Details.**

**TH-180D and  
 TH-180R Single  
 Temperature Room  
 Thermostats,  
 Continued**

**Thermostat Calibration**

The thermostat is factory-calibrated to pass a control pressure of 7 to 8 psi at 72.5°F (48.2 to 55.1 kPa at 22.5°C). The factory sensitivity setting is approximately 2.5 psi per degree Fahrenheit (31.0 kPa per degree Celsius). The supply air pressure to the thermostat should be 18 to 25 psi, 30 psi maximum (124.0 kPa to 172.2 kPa, 206.7 kPa maximum).

1. Verify that the room temperature is between 70°F and 80°F (21°C and 27°C).
2. Remove the thermostat cover using the Cover screw and calibration wrench.
3. Set the thermostat to the room temperature shown on the thermometer by turning the setpoint adjustment knob (on exposed adjustment thermostats), or using the Hex Allen wrench to turn the adjustment nut on top of the concealed adjustment thermostat.
4. Construct Pressure gauge assembly as shown in Figure 9.
5. Loosen the test screw approximately 1/2 turn. Place the pressure gauge hose over the test port body. Stand away from the thermostat for approximately five minutes to prevent body heat temperature influence.
6. If the control pressure gauge does not read 7psi to 8 psi (48.2 kPa to 55.1 kPa), turn the nozzle with the Nozzle wrench until it does. If less than 7 psi to 8 psi, turn the nozzle counterclockwise. If greater than 7psi to 8 psi, turn the nozzle clockwise.
7. Replace thermostat cover and secure the two screws.

The thermostat is now in calibration and the setpoint adjustment can be changed to the desired room temperature.

**Changing Sensitivity**

**NOTE:** To change the sensitivity, carefully move the sensitivity slide to the approximate desired position. It will be 4 psi/°F (49.6 kPa/°C) at the free end of the bi-metal element, decreasing to 1 psi/°F (12.4 kPa/°C) at the rigid end.

The sensitivity slide must always be in contact with the center leg of the element. Recalibrate by rotating the nozzle per *Step 5*.

**Table 2. Troubleshooting Guide.**

<b>Problem</b>	<b>Check</b>	<b>Cause</b>	<b>Action</b>
Control pressure stays at approximately zero	Air supply	Low supply pressure	Recalibrate or replace thermostat
	Nozzle or flapper	Dirt on nozzle or flapper	Clean nozzle or replace thermostat
	Restrictor	Clogged restrictor	Clean or replace restrictor
	Calibration	Out of calibration	Recalibrate
Control pressure stays at approximately supply pressure	Nozzle	Clogged nozzle	Clean nozzle or replace thermostat
	Calibration	Dirt on either supply or exhaust valve seat	Alternately close and open nozzle by gently pushing down the bi-metal
Excessive air leakage from nozzle	Supply and return line connection	Connections are interchanged or connection to port is incorrect	Reverse tubing connections

**TH-180D and  
TH-180R Single  
Temperature Room  
Thermostats,  
Continued****Troubleshooting**

Control pressure remains  
at 1/2 psi (3.4 kPa)

1. Remove the thermostat cover and connect the pressure gauge assembly. See *Thermostat Calibration*, Steps 1 through 4.
2. Check the throttling pin to see if it is in place under the center leg of the bi-metal element.
3. Use the Hex Allen wrench to gently press the center bi-metal and pin. The control pressure should increase. If not, the restriction plate restriction hole, which is .0045-inch (0.11 mm) diameter, may be clogged.
4. Remove the two screws and holding cover.
5. Remove the gaskets and restriction plate.
6. Clean the restriction hole with compressed air.
7. Replace the gasket, restriction plate, rubber gasket and cover.
8. Tighten screws.
9. Replace thermostat cover and tighten the two screws.

Control pressure remains  
at maximum, 25 psi to  
30 psi (172.2 kPa to  
206.7 kPa)

1. Use a flat-blade screwdriver to gently push the center leg of the bi-metal away from the throttling pin.
2. If the control pressure does not drop to approximately 1/2 psi (3.4 kPa), check for a clogged nozzle or a sticking throttling pin.

**NOTE:** Replacement parts are no longer available for this model. If this problem persists, replace the unit with a TH192 Thermostat.

Excessive air leakage  
from nozzle—control  
pressure does not drop

1. If this occurs and the control pressure does not drop to 1/2 psi (3.4 kPa) when the bi-metal is pulled away from the throttling pin, then there is dirt on the throttling pin or brass exhaust valve seat.
2. This dirt particle can usually be removed by moving the pin with a flat-blade screwdriver so that it alternately opens and closes the nozzle. This fluttering action will usually dislodge dirt from the throttling pin or brass exhaust valve seat.

**NOTE:** Replacement parts are no longer available for this model. If this problem persists, replace the unit with a TH-192 Thermostat.

## TH-182 HC Heating-Cooling Thermostat

### Required Tools

- Small, flat-blade screwdriver (not included)
- Nozzle Wrench
- Cover Screw and Calibration Wrench
- Dial Thermometer
- Pressure Gauge Assembly (see Figure 9)

### Thermometer Calibration

1. Verify that the room temperature is between 70°F and 80°F (21°C and 27°C).
2. Remove the thermostat cover using the Cover screw and calibration wrench.
3. Invert cover and place the Cover screw and calibration wrench in the center of the coil of spiral and carefully rotate until the pointer tip indicates the correct room temperature. See Figure 11.

**NOTE:** Do not breathe on or touch the bi-metal element, to avoid influencing the temperature reading.

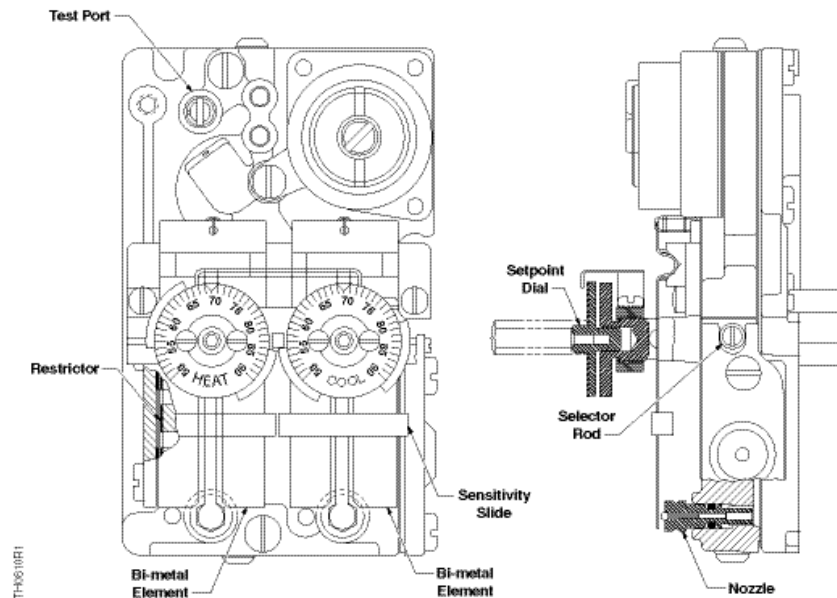


Figure 11. TH 182 HC Thermostat Details.

### Thermostat Calibration

The thermostat is factory-calibrated to pass a control pressure of 7 psi to 8 psi at 72°F (48.2 kPa to 55.1 kPa at 22°C). The factory sensitivity setting is approximately 2-1/4 psi per degree Fahrenheit (27.9 kPa per degree Celsius). Any change in temperature setting or sensitivity of the heating side does not affect the cooling setting and vice versa.

**TH-182 HC Heating-Cooling Thermostat, Continued****Cooling Calibration**

Use 18 psi (124.0 kPa) air supply – Reverse Acting (right bi-metal)

1. Verify that room temperature is between 70°F to 80°F (21.1°C to 26.7°C).
2. Remove the thermostat cover using the Cover screw and calibration wrench.
3. Use the Cover screw and calibration wrench to set the cooling dial to room temperature by inserting it into the center of the setpoint dial and turning to the desired temperature.
4. Construct Pressure gauge assembly as shown in Figure 9.
5. Loosen the test screw approximately 1/2 turn. Place the pressure gauge hose over the test port body. Stand away from the thermostat for approximately five minutes to prevent body heat temperature influence.
6. If the control pressure gauge does not read 7 psi to 8 psi (48.2 kPa to 55.1 kPa), turn the cooling nozzle with the Nozzle wrench until it does. If less than 7 psi to 8 psi, turn the cooling nozzle counterclockwise. If greater than 7 psi to 8 psi, turn the cooling nozzle clockwise.

The cooling element is now in calibration and the setpoint adjustment can be changed to the desired room temperature. Proceed to *Heating Calibration*.

**Heating Calibration**

Use 25 psi (172.2 kPa) air supply – Direct Acting (left bi-metal)

1. Verify that the room temperature is between 70°F and 80°F (21°C and 27°C).
2. Remove the thermostat cover using the Cover screw and calibration wrench.
3. Use the Cover screw and calibration wrench to set the heating dial to room temperature by inserting it into the center of the setpoint dial and turning to the desired temperature.
4. Construct the Pressure gauge assembly as shown in Figure 9.
5. Loosen the test screw approximately 1/2 turn. Place the pressure gauge hose over the test port body. Stand away from the thermostat for approximately five minutes to prevent body heat temperature influence.
6. If the control pressure gauge does not read 7 psi to 8 psi (48.2 kPa to 55.1 kPa), turn the heating nozzle with the Nozzle wrench until it does. If less than 7 to 8 psi, turn the heating nozzle counterclockwise. If greater than 7 psi to 8 psi (48.2 kPa to 55.1 kPa), turn the heating nozzle clockwise.
7. Replace the thermostat cover and tighten the two screws.

The heating element is now in calibration and the setpoint adjustment can be changed to the desired room temperature.

**Use of Selector Rod**

(To switch from heating to cooling nozzle)

The supply pressure may be changed at any individual thermostat to facilitate calibration.

1. Apply 25 psi (172.2 kPa) air supply on the system.
2. Use a small, flat-blade screwdriver to push the selector rod until it locks in.

**NOTE:** You may have to rotate the screw to do this.

The cooling nozzle and bi-metal now control, and may be calibrated. See *Cooling Calibration*, Steps 2 through 5. Turn the rod to unlatch it when calibration is complete.

**Changing Sensitivity**

To change the sensitivity, carefully move the sensitivity slide to the approximate desired position. It will be 4 psi/°F (49.6 kPa/°C) at the free end of the bi-metal element, down to 1 psi/°F (12.4 kPa/°C) at the rigid end.

Adjust one bi-metal slide at a time.

The sensitivity of the slide must always be in contact with the center leg of the element. Recalibrate by rotating the nozzle. See *Heating or Cooling Calibration Step 4*.

**CAUTION:**

The element must be recalibrated whenever sensitivity is changed.

## TH-182 HC Heating-Cooling Thermostat, Continued

### Troubleshooting

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There are three types of malfunction that might occur, and these can be corrected as follows. Before beginning:

- Ensure that there is 18 psi or 25 psi (124.0 kPa and 172.2 kPa) of clean, dry air supply.

**NOTE:** Only one bi-metal element with its nozzle and throttling pin will operate at a given time, and the choice of this operating element will be governed by the supply pressure.

- Use the Pressure gauge assembly (Figure 9) to measure control pressure.
- 

If control pressure remains at 1/2 psi (3.4 kPa)

1. Use either 18 psi (cooling) or 25 psi (heating) (124.0 kPa or 172.2 kPa) air supply.
  2. Remove the thermostat cover and connect the Pressure gauge assembly. See *Thermostat Calibration, Steps 1 through 4*.
  3. Check the throttling pin to see if it is in place under the center leg of the bi-metal element.
  4. Use the Cover screw and calibration wrench to gently press the center bi-metal and pin. The control pressure should increase. If not, the restriction plate restriction hole, which is .0045-inch (0.11 mm) diameter, may be clogged.
  5. Remove the two screws and restriction cover.
  6. Remove the gaskets and restriction plate.
  7. Clean the restriction hole with compressed air.
  8. Replace the gasket, restriction plate, rubber gasket and cover.
  9. Tighten screws.
  10. Replace thermostat cover and tighten the two screws.
- 

If control pressure remains at maximum 18 or 25 psi (124.0 or 172.2 kPa)

1. Test both the heating and cooling supply pressures, since either nozzle could be clogged.
2. Use a flat-blade screwdriver to gently push the center leg of the bi-metal away from the throttling pin.
3. If the control pressure does not drop to approximately 1/2 psi, check for a clogged nozzle or a sticking throttling pin.

**NOTE:** Replacement parts are no longer available for these models. If this problem persists, replace the unit with a TH-192 Thermostat.

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If excessive Air Leakage from Nozzle—Control Pressure Does Not Drop

1. Use either the 18 (cooling) or 25 (heating) psi (124.0 or 172.2 kPa) air supply.
2. If the control pressure does not drop to 1/2 psi (3.4 kPa) when the bi-metal is pulled away from the throttling pin, then there is dirt on the throttling pin or brass exhaust valve seat.
3. This dirt particle can usually be removed by moving the pin with a flat-blade screwdriver so that it alternately opens and closes the nozzle. This fluttering action will usually dislodge dirt from the throttling pin or brass exhaust valve seat.

**NOTE:** Replacement parts are no longer available for these models. If this problem persists, replace the unit with a TH-192 Thermostat.

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**TH-182DN and TH-182 DNV Day-Night and Day-Night Vent Thermostats**

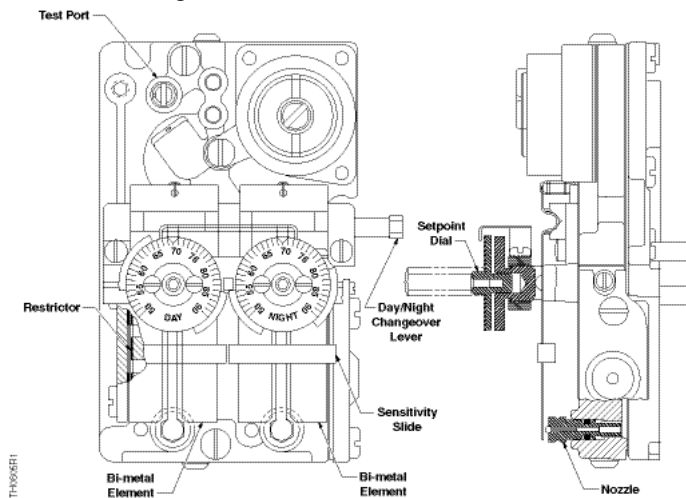
**Required Tools**

- Small, flat-blade screwdriver (not included)
- Nozzle Wrench
- Cover Screw and Calibration Wrench
- Dial Thermometer
- Pressure Gauge Assembly (see Figure 9)

**Thermometer Calibration**

1. Verify that the room temperature is between 70°F and 80°F (21°C and 27°C).
2. Remove the thermostat cover using the Cover screw and calibration wrench.
3. Invert cover and place the Cover screw and calibration wrench in the center of the coil of spiral and carefully rotate until the pointer tip indicates the correct room temperature.

**NOTE:** Do not breathe on or touch the bi-metal element, to avoid influencing the temperature reading.



**Figure 12. TH182 DN Thermostat Details.**

**Thermostat Calibration**

The thermostat is factory-calibrated to pass a control pressure of 7 psi to 8 psi at 72°F (48.2 kPa to 55.1 kPa at 22°C). The factory sensitivity setting is approximately 2-1/4 psi per degree Fahrenheit (27.9 kPa per degree Celsius). Any change in temperature setting or sensitivity of the heating side does not affect the cooling setting and vice versa.

**Day Setting Calibration**

Use 18 psi (124.1 kPa) air supply (right bi-metal)

1. Verify that the room temperature is between 70°F and 80°F (21°C and 27°C).
2. Remove the thermostat cover using the Cover screw and calibration wrench.
3. Use the Hex Allen wrench to set the day room temperature by inserting it into the center of the setpoint dial and turning to the desired temperature.
4. Construct the Pressure gauge assembly as shown in Figure 9..
5. Loosen the test screw approximately 1/2 turn. Place the pressure gauge hose over the test port body. Stand away from the thermostat for approximately five minutes to prevent body heat temperature influence.
8. If the control pressure gauge does not read 7 psi to 8 psi (48.2 kPa to 55.1 kPa), turn the day nozzle with the Nozzle wrench until it does. If less than 7 psi to 8 psi (48.2 kPa to 55.1 kPa), turn the day nozzle counterclockwise. If greater than 7 psi to 8 psi (48.2 kPa to 55.1 kPa), turn the day nozzle clockwise.

The thermostat day setting is now in calibration; proceed to *Night Setting Calibration*.

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## TH-182DN and TH-182 DNV Day-Night and Day-Night Vent Thermostats, Continued

### Night Setting Calibration

Use 25 psi (172.2 kPa) air supply (left bi-metal)

1. Verify that the room temperature is between 70°F and 80°F (21°C and 27°C).
2. Use the Cover screw and calibration wrench to set the night room temperature by inserting it into the center of the setpoint dial and turning to the desired temperature.
3. Construct the Pressure gauge assembly as shown in Figure 9.
4. Loosen the test screw approximately 1/2 turn. Place the pressure gauge hose over the test port body. Stand away from the thermostat for approximately five minutes to prevent body heat temperature influence.
5. If the control pressure gauge does not read 7 psi to 8 psi (48.2 to 55.1 kPa), turn the night nozzle with the Nozzle wrench until it does. If less than 7 psi to 8 psi (48.2 kPa to 55.1 kPa), turn the night nozzle counterclockwise. If greater than 7 psi to 8 psi (48.2 kPa to 55.1 kPa), turn the night nozzle clockwise.
6. Replace the cover and tighten the two screws.

The thermostat night setting is now in calibration and the setpoint adjustment can be changed to the desired room temperature.

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### Use of Manual Selector

The manual selector permits any individual thermostat to operate at its day setting even though the system is on night supply pressure (25 psi [172.4 kPa]). To latch (lock in) the selector, its handle must point down. This position is stamped DAY on the cover.

To operate, push the selector in, toward the thermostat, until it latches. To return to night setting, rotate the handle until it unlatches and comes out to its normal position. This position is stamped AUTO on the cover.

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### Changing Sensitivity

To change the sensitivity, carefully move the sensitivity slide to the approximate desired position. It will be 4 psi/°F (49.6 kPa/°C) at the free end of the bi-metal element, down to 1 psi/°F (12.4 kPa/°C) at the rigid end.

Adjust one bi-metal slide at a time.

The sensitivity of the slide must always be in contact with the center leg of the element. Recalibrate by rotating the nozzle. See *Heating or Cooling Calibration* Step 4.



#### CAUTION:

The element must be recalibrated whenever sensitivity is changed.

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### DNV Maintenance

The night vent connection of the TH-182 DNV thermostat must be connected to a dead end chamber (a damper actuator, for example), or vent port R2 must be plugged. If not connected or plugged, it will exhaust to the atmosphere, and prevent changeover from day to night operation. Any leak in the night vent air line can also prevent changeover.

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### Troubleshooting

There are three types of malfunction that might occur, and these can be corrected as follows. Before beginning:

- Ensure that there is 18 psi or 25 psi (124.0 kPa and 172.2 kPa) of clean, dry air supply.

**NOTE:** Only one bi-metal element with its nozzle and throttling pin will operate at a given time, and the choice of this operating element will be governed by the supply pressure.

- Use the Pressure gauge assembly (Figure 9) to measure control pressure.

**TH-182DN and  
TH-182 DNV Day-  
Night and Day-Night  
Vent Thermostats,  
Continued**

If control pressure remains  
at 1/2 psi (3.4 kPa)

1. Use either 18 psi (day) or 25 psi (night) (124.0 or 172.2 kPa) air supply.
2. Remove the thermostat cover and connect the pressure gauge. See *Thermostat Calibration*, Steps 1 through 4.
3. Check the throttling pin to see if it is in place under the center leg of the bi-metal element.
4. Use the Cover screw and calibration wrench to gently press the center bi-metal and pin. The control pressure should increase. If not, the restriction plate restriction hole, which is .0045-inch (0.11 mm) diameter, may be clogged.
5. Remove the two screws and holding cover.
6. Remove the gaskets and restriction plate.
7. Clean the restriction hole with compressed air.
8. Replace the gasket, restriction plate, rubber gasket and cover.
9. Tighten screws.

If control pressure remains  
at maximum 18 or 25 psi  
(124.0 or 172.2 kPa)

1. Test both the day and night supply pressures, since either nozzle could be clogged.
2. Use a flat-blade screwdriver to gently push the center leg of the bi-metal away from the throttling pin.
3. If the control pressure does not drop to approximately 1/2 psi, check for a clogged nozzle or a sticking throttling pin.

**NOTE:** Replacement parts are no longer available for these models. If this problem persists, replace the unit with a TH-192 Thermostat.

If excessive Air Leakage  
from Nozzle—Control  
Pressure Does Not Drop

1. Use either the 18 psi or 25 psi (124.0 kPa or 172.2 kPa) air supply.
4. If the control pressure does not drop to 1/2 psi (3.4 kPa) when the bi-metal is pulled away from the throttling pin, then there is dirt on the throttling pin or brass exhaust valve seat.
5. This dirt particle can usually be removed by moving the pin with a flat-blade screwdriver so that it alternately opens and closes the nozzle. This fluttering action will usually dislodge dirt from the throttling pin or brass exhaust valve seat.

**NOTE:** Replacement parts are no longer available for this model. If this problem persists, replace the unit with a TH-192 Thermostat.

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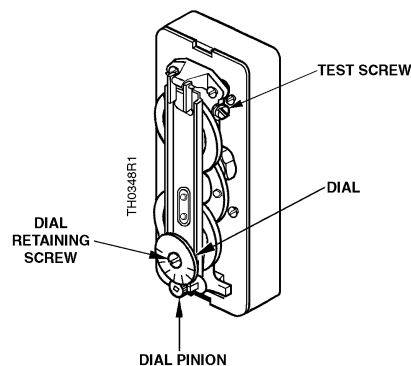
## Direct Acting D Room Thermostat Required Tools

- D Adjustment Key
- Small, flat-blade screwdriver (not included)
- Dial Thermometer
- Pressure Gauge Assembly (see Figure 9)

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## Calibration

1. Verify that the room temperature is between 70°F and 80°F (21°C and 27°C).
2. Remove thermostat cover using D Adjustment Key.
3. Construct Pressure gauge assembly as shown in Figure 9.
4. Loosen test screw (see Figure 13) using a screwdriver, 1/2 turn counterclockwise.
5. Attach Pressure gauge assembly over the test screw body.



**Figure 13. Direct Acting D Thermostat Details.**

6. Stand away from thermostat for about five minutes to prevent body heat temperature influence. If control pressure does not read 7 psi to 8 psi (48 kPa to 55 kPa), turn adjustment screw with the D Adjustment Key as follows:
  - If less than 7 psi to 8 psi (48 kPa to 55 kPa), turn the adjustment screw clockwise.
  - If greater than 7 psi to 8 psi (48 kPa to 55 kPa), turn the adjustment screw counterclockwise.

If there is no change in pressure, the thermostat is not functioning and should be replaced with Part Number 832-040 D Thermostat Replacement unit.

7. If the dial reading and room temperature do not agree, loosen dial retaining screw with a screwdriver. (See Figure 13.)
8. Tilt and rotate until dial reading agrees with room temperature. Do not turn dial pinion.
9. Retighten dial retaining screw.
10. Remove the D Adjustment Key and Pressure gauge assembly, and let pressure stabilize.
11. Verify that the control pressure remains between 7 to 8 psi.
12. Replace the thermostat cover and tighten the two screws.

The thermostat is now in calibration and can be set to the desired room temperature.

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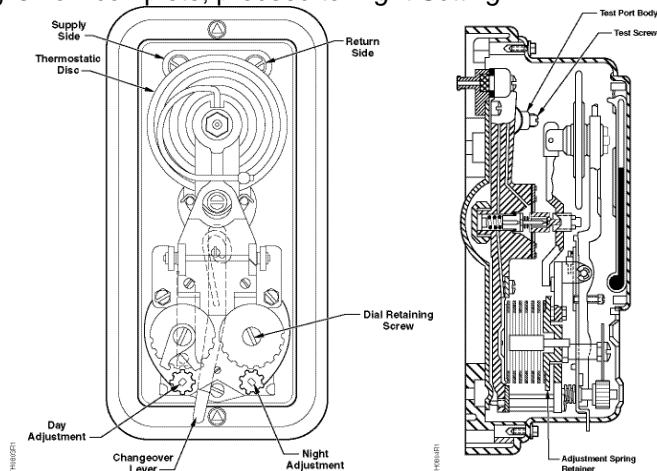
**D Day-Night  
 Thermostats  
 Required Tools**

- D Adjustment Key
- Small, flat-blade screwdriver (not included)
- Dial Thermometer
- Pressure Gauge Assembly (see Figure 9)

**Calibration  
 Day Setting**

1. Verify that the room temperature is between 70°F and 80°F (21°C and 27°C).
  2. Remove the thermostat cover using the D Adjustment Key.
  3. Verify that the supply pressure is 18 psi (124 kPa) pressure.
  4. Construct the Pressure gauge assembly as shown in Figure 9.
  5. Loosen test screw one complete turn, using a screwdriver. Place the pressure gauge hose over the test port body. Wait several minutes after installing the test gauge hose before recalibrating. Stand away from the thermostat for approximately five minutes to prevent body heat temperature influence.
  6. Adjust the day dial (left) to the actual room temperature. The test gauge should then read 7 psi to 8 psi (48 to 55 kPa). If this is not the case, turn the adjusting post using the D Adjustment Key, as follows:
    - If less than 7 psi to 8 psi (48 kPa to 55 kPa), turn the adjustment screw counterclockwise.
    - If greater than 7 psi to 8 psi (48 kPa to 55 kPa), turn the adjustment screw clockwise.
- If there is no change in pressure, the thermostat is not functioning and should be replaced with Part Number 182-041 DN Thermostat Replacement kit.
7. Loosen the day dial retaining screw with a screwdriver and reset the day temperature dial to the correct room temperature.
  8. Tilt and rotate until dial reading agrees with room temperature. Do not turn dial pinion.
  9. Retighten dial retainer screw being careful not to change the setting of adjustment post. Be careful not to come in contact with thermostatic disc.
  10. Remove the D Adjustment Key and Pressure gauge assembly, and let pressure stabilize.
  11. Verify that the control pressure remains between 7 to 8 psi.

The Day Setting is now complete; proceed to *Night Setting*.



**Figure 14. D Day-Night Thermostat Details.**

---

## **D Day-Night Thermostats, Continued**

### **Night Setting**

1. Verify that the room temperature is between 70°F and 80°F (21°C and 27°C).
  2. Verify that the supply pressure is 25 psi (172 kPa).
  3. Repeat *Day Setting* Steps 4 through 11 to calibrate the night (right) scale.
  4. Replace the thermostat cover and tighten the two screws.
- 

### **Manual Reset - System on 25 psi (172 kPa) Night Operation**

1. Set changeover lever to the right until a "click" is felt. The thermostat is now controlling at the day dial setting (see Figure 14).
2. Return thermostat supply pressure to day 18 psi (124 kPa). The manual reset lever should automatically return to the left hand side of day cycle.
3. If the manual reset lever does not return to the left hand side when the supply pressure is 18 psi (124 kPa), the tension of spring will have to be increased by turning the adjustment spring retainer clockwise. About one complete turn of the adjustment spring retainer clockwise will increase the pressure change about 1 psi (7 kPa).

For example: If the manual reset lever is returned to the day setting at 17-1/2 psi (120.6 kPa) system pressure, then the spring tension should be increased so that it would switch over at about 18-1/4 psi (125.7 kPa). This would be approximately three-fourths of a complete turn of the adjustment spring retainer.

4. Apply 25 psi (172 kPa) night supply pressure. Move reset lever to right. Thermostat will now control at day dial setting. Check calibration.
  5. Move reset lever back to left. Thermostat will now control at night dial setting. Check calibration.
  6. The thermostat is now in calibration. Test hose should be removed and test plug screwed in tightly.
  7. Replace the thermostat cover and tighten the two cover screws.
-

**TH-192 S Single Temperature Room Thermostat**

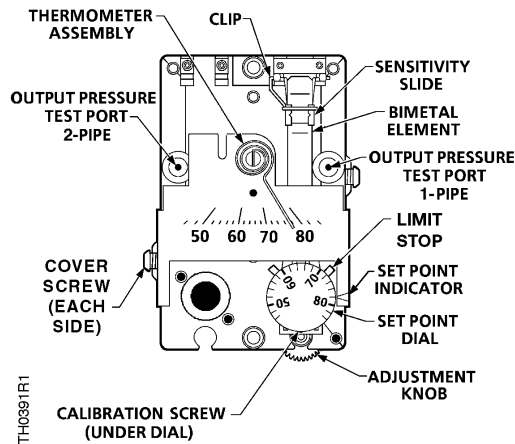
**Required Tools**

- Small, flat-blade screwdriver (not included)
- Needle nose pliers
- Cover Screw and Calibration Wrench
- Dial Thermometer
- Dual Scale Pressure Gauge and Pressure Tap Needle (assembled)

**Thermometer Calibration**

1. Verify that the room temperature is between 70°F and 80°F (21°C and 27°C).
2. Remove thermostat cover using the Cover screw and calibration wrench.
3. Place a screwdriver in the center of the thermometer assembly (see Figure 15). Carefully rotate the thermometer assembly until the pointer tip indicates the correct room temperature.

**NOTE:** Do not breathe on or touch the bi-metal element, to avoid influencing the temperature reading.



**Figure 15. TH-192 S Thermostat Details.**

**Sensitivity Adjustment**

The factory thermostat sensitivity setting is approximately 2.5 psi/°F (31 kPa/°C). To change the sensitivity, use a flat-blade screwdriver to carefully move the sensitivity slide (see Figure 15) to the desired position as follows:

Graduation closest to the rigid end of the bi-metal element  
 4 psi/°F (50 kPa/°C)



Graduation closest to the minimum (MIN) end of the bi-metal element  
 1 psi/°F (12 kPa/°C)



**CAUTION:**

Thermostats must be recalibrated whenever sensitivity is changed.

**Limit Stop Adjustment**

Thermostat limit stops define the minimum and maximum thermostat setpoints. The limit stops engage in the setpoint cam gear teeth and cause interference between the setpoint cam gear and the adjustment knob gear.

To change the limit stop settings:

1. If not already done, remove the thermostat cover using the Cover screw and calibration wrench.
2. Use a needle nose pliers to pull the limit stop tab (see Figure 15).
3. Rotate the limit stop to its new position.
4. Reposition between the setpoint cam gear teeth. Do not pull the limit stop any more than necessary to clear the gear teeth.

---

**Limit Stop Adjustment,  
Continued**

5. Repeat with second limit stop tab.

**NOTE:** Changing the limit stop position one gear tooth changes the limit stop setting by 1-1/3°F (0.7°C).

---

**Thermostat Calibration**

The thermostat is factory calibrated to a control pressure of 7.5 psi (52 kPa) when the setpoint and the ambient temperature are both at 72°F (22°C). No adjustments are required if these settings are appropriate.

If the thermostat has been tampered with, the sensitivity changed, or it is out of adjustment, use the following steps to recalibrate the instrument.

The output pressure test port (see Figure 15) is accessible without removing the thermostat cover through the eighth opening:

- For one-pipe thermostats, the test port is on the *right* side.
- For two-pipe thermostats, the test port is on the *left* side.



**CAUTION:**

If you use the wrong test port, thermostat damage can occur and result in replacement of the device.

1. Verify that the room temperature is between 70°F and 80°F (21°C and 27°C).
2. If not already done, remove the cover using the Cover screw and calibration wrench.
3. Verify that the supply pressure is 18 psi to 25 psi (124 kPa to 172 kPa), 30 psi (207 kPa) maximum. Set the dial to the room temperature by turning the exposed adjustment knob. Allow the thermostat to stand for about five minutes to adjust to the new setting.
4. Moisten the needle and insert the test gauge and needle adapter in the output pressure test port (see Figure 15). Read the control pressure.
5. If the control pressure gauge does not read 7 to 8 psi (48.2 kPa to 55.1 kPa), turn the calibration screw with the Cover screw and calibration wrench or 1/8-inch wrench until it does.
  - If less than 7 psi to 8 psi (48 kPa to 55 kPa), turn the calibration screw clockwise.
  - If greater than 7 psi to 8 psi (48 kPa to 55 kPa), turn the calibration screw counterclockwise.
6. Remove the Cover screw and calibration wrench, and let the pressure stabilize.
7. Verify that the control pressure remains between 7 and 8 psi (48.2 kPa to 55.1 kPa).
8. Replace the thermostat cover and tighten the two screws.

The sensing element is now in calibration and the setpoint can be changed to the desired room temperature.

---

**Troubleshooting**

Before troubleshooting the thermostat per Table 2, ensure there is clean dry supply air at 18 psi to 25 psi (12 kPa to 172 kPa) minimum, 30 psi (207 kPa) maximum.

Use the Dual Scale Pressure Gauge and Pressure Tap Needle (assembled) to measure the control pressure at the output test port (see Figure 15). The output pressure test port is accessible without removing the thermostat cover through the eighth opening from the top as follows:

- For one-pipe thermostats, the port is on the *right* side.
- For two-pipe thermostats, the port is on the *left* side.



**CAUTION:**

If you use the wrong test port, thermostat damage can occur and result in replacement of the device.

---



**TH192 HC Heating/  
 Cooling Room  
 Thermostat  
 Required Tools**

- Small, flat-blade screwdriver (not included)
- Needle nose pliers
- Dial Thermometer
- Cover Screw and Calibration Wrench
- Dual Scale Pressure Gauge and Pressure Tap Needle, assembled

**Thermometer  
 Calibration**

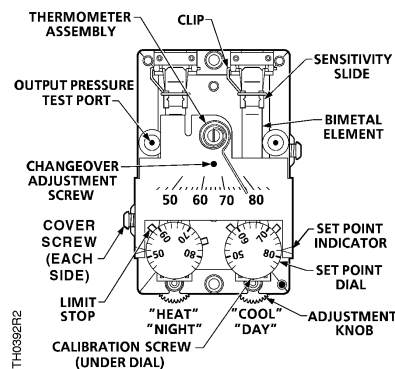
1. Verify that the room temperature is between 70°F and 80°F (21°C and 27°C).
2. Remove cover using the Cover screw and calibration wrench.
3. Place a screwdriver in the center of the thermometer assembly (See Figure 16).
4. Carefully rotate the thermometer assembly until the pointer tip indicates the correct room temperature.

**NOTE:** Do not breathe on or touch the bi-metal element, to avoid influencing the temperature reading.

**Changeover Point  
 Adjustment**

The changeover point is factory set to occur between 19 psi and 22 psi (131 kPa and 152 kPa). The changeover point can be field adjusted to occur between 14 psi and 22 psi (96 kPa and 152 kPa).

1. Connect a pressure gauge or a manometer to measure the supply pressure to the thermostat. Use 30 psi (207 kPa) supply through a positioning switch so pressure can be fully variable.
2. Determine the current changeover point. Turn the cooling dial so that the cooling and heating control pressures are different. Then note the changeover point on the control gauge as the supply pressure changes.
3. Place the Cover screw and calibration wrench in the opening of the thermometer assembly (see Figure 16) to adjust the changeover adjustment screw as follows:
  - a. If the changeover is too high, turn off the supply pressure and rotate the changeover adjustment screw clockwise. One turn decreases the changeover point by about 3 psi (20 kPa). Turn on the supply pressure and recheck to verify the new changeover point.
  - b. If the changeover is too low, turn off the supply pressure and rotate the changeover adjustment screw counterclockwise. One turn increases the changeover point by about 3 psi (20 kPa). Turn on the supply pressure and recheck to verify the new changeover point.



**Figure 16. TH192 HC Thermostat Details.**

## TH192 HC Heating/ Cooling Room Thermostat

### Sensitivity Adjustment

The factory thermostat sensitivity setting is approximately 2.5 psi/°F (31 kPa/°C). To change the sensitivity, use a flat-blade screwdriver to carefully move the sensitivity slide (see Figure 16) to the desired position as follows:

Graduation closest to the rigid  
end of the bi-metal element  
4 psi/°F (50 kPa/°C)



Graduation closest to the  
minimum (MIN) end of the bi-  
metal element  
1 psi/°F (12 kPa/°C)



#### CAUTION:

Thermostats must be recalibrated whenever sensitivity is changed.

### Limit Stop Adjustment

Thermostat limit stops define the minimum and maximum thermostat set points. The limit stops engage in the set point cam gear teeth and cause interference between the set point cam gear and the adjustment knob gear.

To change the limit stop settings:

1. If not already done, remove the thermostat cover using the Cover screw and calibration wrench.
2. Use a needle nose pliers to pull the limit stop tab (see Figure 16).
3. Rotate the limit stop to its new position.
4. Reposition between the setpoint cam gear teeth. Do not pull the limit stop any more than necessary to clear the gear teeth.
5. Repeat with second limit stop tab.

**NOTE:** Changing the limit stop position one gear tooth changes the limit stop setting by 1-1/3°F (0.7°C).

### Thermostat Calibration

The thermostat is factory calibrated to a control pressure of 7.5 psi (52 kPa) when the setpoint and the ambient temperature are both at 72°F (22°C). No adjustments are required if these settings are appropriate.

If the thermostat has been tampered with, the sensitivity changed, or it is out of adjustment, use the following steps to recalibrate the instrument.

The output pressure test port (see Figure 16) is accessible without removing the thermostat cover through the eighth opening:

**NOTE:** For TH192 HC thermostats, the test port is on the *left* side.



#### CAUTION:

If you use the wrong test port, thermostat damage can occur and result in replacement of the device.

**TH192 HC Heating/  
Cooling Room  
Thermostat,  
Continued****Cooling Calibration**

1. Verify that the room temperature is between 70°F and 80°F (21°C and 27°C).
2. If not already done, remove the cover using the Cover screw and calibration wrench.
3. Verify that the supply pressure is 18 psi (124 kPa). Set the cooling dial to the room temperature by turning the exposed adjustment knob. Allow the thermostat to stand for about five minutes to adjust to the new setting.
4. Moisten the needle and insert the test gauge and needle adapter in the output pressure test port (see Figure 16). Read the control pressure.
5. If the control pressure gauge does not read 7 psi to 8 psi (48.2 kPa to 55.1 kPa), turn the calibration screw with the Cover screw and calibration wrench or 1/8-inch wrench until it does.
  - If less than 7 psi to 8 psi (48.2 kPa to 55.1 kPa), turn the calibration screw clockwise.
  - If greater than 7 psi to 8 psi (48.2 kPa to 55.1 kPa), turn the calibration screw counterclockwise.
6. Remove the Cover screw and calibration wrench and let the pressure stabilize.
7. Verify that the pressure is between 7 psi to 8 psi (48.2 kPa to 55.1 kPa).

The cooling calibration is complete. Proceed to *Heating Calibration*.

**Heating Calibration**

1. Verify that the room temperature is between 70°F and 80°F (21°C and 27°C).
2. Verify that the supply pressure is 25 psi (172 kPa). Set the heating dial to the room temperature by turning the exposed adjustment knob. Allow the thermostat to stand for about five minutes to adjust to the new setting.
3. Moisten the needle and insert the test gauge and needle adapter in the output pressure test port (see Figure 16). Read the control pressure.
4. If the control pressure gauge does not read 7 psi to 8 psi (48.2 to 55.1 kPa), turn the calibration screw with the Cover screw and calibration wrench or 1/8-inch wrench until it does.
  - If less than 7 psi to 8 psi, turn the calibration screw clockwise.
  - If greater than 7 psi to 8 psi, turn the calibration screw counterclockwise.
5. Remove the Cover screw and calibration wrench and let the pressure stabilize.
6. Verify that the pressure is between 7 psi to 8 psi (48.2 kPa to 55.1 kPa).
7. Replace the thermostat cover and tighten the two screws.

The heating calibration is now complete, and the setpoint can be changed to the desired room temperature.

**Troubleshooting**

Before troubleshooting the thermostat per Table 2, make certain there is clean dry supply air at 18 psi (cooling) or 25 psi (heating) (124 kPa to 172 kPa).

Use the Dual Scale Pressure Gauge and Pressure Tap Needle to measure the control pressure at the output test port (see Figure 16). The output pressure test port is accessible without removing the thermostat cover through the eighth opening from the top as follows:

**NOTE:** For TH192 HC thermostats, the test port is on the *left* side.

**CAUTION:**

If you use the wrong test port, thermostat damage can occur and result in replacement of the device.

**TH192 DN  
Day/Night and DNV  
Room Thermostat  
Required Tools**

- Small, flat-blade screwdriver (not included)
- Needle nose pliers
- Cover Screw and Calibration Wrench
- Dial Thermometer
- Dual Scale Pressure Gauge and Pressure Tap Needle, assembled

**Thermometer  
Calibration**

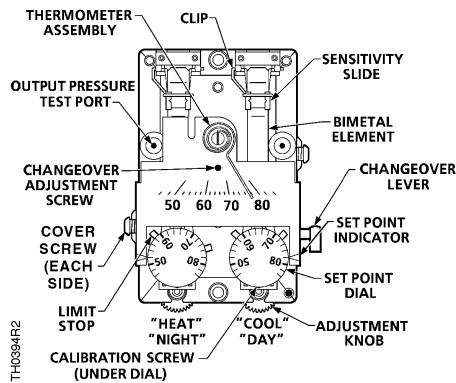
1. Verify that the room temperature is between 70°F and 80°F (21°C and 27°C).
2. Remove cover using the Cover screw and calibration wrench.
3. Place a screwdriver in the center of the thermometer assembly (see Figure 17). Carefully rotate the thermometer assembly until the pointer tip indicates the correct room temperature.

**NOTE:** Do not breathe on or touch the bi-metal element, to avoid influencing the temperature reading.

**Changeover Point  
Adjustment**

The changeover point is factory set to occur between 19 psi and 22 psi (131 kPa and 152 kPa). The changeover point can be field adjustable to occur between 14 psi and 22 psi (96 kPa and 152 kPa).

1. Connect a pressure gauge or a manometer to measure the supply pressure to the thermostat. Use 30 psi (207 kPa) supply through a positioning switch so pressure can be fully variable.
2. Determine the current changeover point. Turn the cooling dial so that the cooling and heating control pressures are different. Then note the changeover point on the control gauge as the supply pressure changes.
3. Place the Cover screw and calibration wrench in the opening of the thermometer assembly (see Figure 17) to adjust the changeover adjustment screw as follows:
  - a. If the changeover is too high, turn off the supply pressure and rotate the changeover adjustment screw clockwise. One turn decreases the changeover point by about 3 psi (20 kPa). Turn on the supply pressure and recheck to verify the new changeover point.
  - b. If the changeover is too low, turn off the supply pressure and rotate the changeover adjustment screw counterclockwise. One turn increases the changeover point by about 3 psi (20 kPa). Turn on the supply pressure and recheck to verify the new changeover point.



**Figure 17. TH192 DN and TH192 DNV Thermostat Details.**

**TH192 DN Day/Night  
 and DNV Room  
 Thermostat,  
 Continued**

**Sensitivity Adjustment**

The factory thermostat sensitivity setting is approximately 2.5 psi/°F (31 kPa/°C). To change the sensitivity, use a flat-blade screwdriver to carefully move the sensitivity slide (see Figure 16) to the desired position as follows:

Graduation closest to the rigid  
 end of the bi-metal element  
 4 psi/°F (50 kPa/°C)



Graduation closest to the  
 minimum (MIN) end of the bi-  
 metal element  
 1 psi/°F (12 kPa/°C)



**CAUTION:**

Thermostats must be recalibrated whenever sensitivity is changed.

**Limit Stop Adjustment**

Thermostat limit stops define the minimum and maximum thermostat setpoints. The limit stops engage in the setpoint cam gear teeth and cause interference between the set point cam gear and the adjustment knob gear.

To change the limit stop settings:

1. If not already done, remove the thermostat cover using the Cover Screw and Calibration Wrench.
2. Use a needle nose pliers to pull the limit stop tab (see Figure 17).
3. Rotate the limit stop to its new position.
4. Reposition between the setpoint cam gear teeth. Do not pull the limit stop any more than necessary to clear the gear teeth.
5. Repeat with second limit stop tab.

**NOTE:** Changing the limit stop position one gear tooth changes the limit stop setting by 1-1/3°F (0.7°C).

**Thermostat Calibration**

The thermostat is factory calibrated to a control pressure of 7.5 psi (52 kPa) when the setpoint and the ambient temperature are both at 72°F (22°C). No adjustments are required if these settings are appropriate.

If the thermostat has been tampered with, the sensitivity changed, or it is out of adjustment, use the following steps to recalibrate the instrument.

The output pressure test port (see Figure 17) is accessible without removing the thermostat cover through the eighth opening:

**NOTE:** For TH192 DN and DNV thermostats, the test port is on the *left* side.



**CAUTION:**

If you use the wrong test port, thermostat damage can occur and result in replacement of the device.

---

## TH192 DN Day/Night and DNV Room Thermostat, Continued

### Day Setting Calibration

1. Verify that the room temperature is between 70°F and 80°F (21°C and 27°C).
2. Remove the cover using the Cover screw and calibration wrench.
3. Verify that the supply pressure is 18 psi to 25 psi (124 kPa to 72 kPa). Set the day (right) dial to the room temperature by turning the exposed adjustment knob. Allow the thermostat to stand for about five minutes to adjust to the new setting.
4. Moisten the needle and insert the test gauge and needle adapter in the output pressure test port (see Figure 17). Read the control pressure.
5. If the control pressure does not read 7 psi to 8 psi (48 kPa to 55 kPa), turn the calibration screw (see
6. Figure 16) using the Cover screw and calibration wrench or a 1/8-inch wrench as follows:
  - If less than 7 psi to 8 psi (48 kPa to 55 kPa), turn the calibration screw clockwise.
  - If greater 7 psi to 8 psi (48 kPa to 55 kPa), turn the calibration screw counterclockwise.
7. Remove the wrench and let the pressure stabilize.
8. Verify that the pressure is between 7 psi to 8 psi (48 kPa to 55 kPa).

The Day calibration is now complete. Proceed to *Night Calibration*.

---

### Night Setting Calibration

1. Verify that the room temperature is between 70°F and 80°F (21°C and 27°C).
2. Verify that the supply pressure is 18 psi to 25 psi (124 kPa to 172 kPa). Set the night (left) dial to the room temperature by turning the exposed adjustment knob. Allow the thermostat to stand for about five minutes to adjust to the new setting.
3. Repeat *Day Setting Cooling Calibration* steps 4 through 8.
4. Replace the thermostat cover and tighten the two screws.

The Night calibration is now complete, and the setpoint can be changed to the desired room temperature.

---

### Troubleshooting

Before troubleshooting the thermostat per Table 2, make certain there is clean dry supply air at 18 psi (day) or 25 (night) psi (124 or 172 kPa).

Use the Dual Scale Pressure Gauge and Pressure Tap Needle to measure the control pressure at the output test port (see Figure 17). The output pressure test port is accessible without removing the thermostat cover through the eighth opening from the top as follows:

**NOTE:** For TH192 DN and DNV thermostats, the test port is on the *left* side.



**CAUTION:**

If you use the wrong test port, thermostat damage can occur and result in replacement of the device.

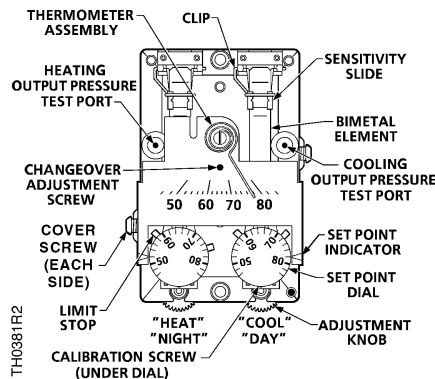
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**Free Energy  
 Band™ TH193 HC  
 Heating/Cooling  
 Room Thermostat  
 Required Tools**

- Small, flat-blade screwdriver (not included)
- Needle nose pliers
- Cover Screw and Calibration Wrench
- Dial Thermometer
- Dual Scale Pressure Gauge and Pressure Tap Needle, assembled

**Thermometer  
 Calibration**

1. Verify that the room temperature is between 70°F and 80°F (21°C and 27°C).
2. Remove the thermostat cover using the Cover screw and calibration wrench.
3. Place a screwdriver in the center of the thermometer assembly (see Figure 18). Carefully rotate the thermometer assembly until the pointer tip indicates the correct room temperature.



**Figure 18. Free Energy Band TH193 HC Thermostat Details.**

**NOTE:** Do not breathe on or touch the bi-metal element, to avoid influencing the temperature reading.

**Sensitivity Adjustment**

The factory thermostat sensitivity setting is approximately 2.5 psi/°F (31 kPa/°C). To change the sensitivity, use a flat-blade screwdriver to carefully move the sensitivity slide (see Figure 18) to the desired position as follows:

Graduation closest to the rigid end of the bi-metal element  
 4 psi/°F (50 kPa/°C)



Graduation closest to the minimum (MIN) end of the bi-metal element  
 1 psi/°F (12 kPa/°C)



**CAUTION:**

Thermostats must be recalibrated whenever sensitivity is changed.

## Free Energy Band™ TH193 HC Heating/Cooling Room Thermostat, Continued

### Limit Stop Adjustment

---

Thermostat limit stops define the minimum and maximum thermostat setpoints. The limit stops engage in the setpoint cam gear teeth and cause interference between the set point cam gear and the adjustment knob gear.

To change the limit stop settings:

1. If not already done, remove the thermostat cover using the Cover screw and calibration wrench.
2. Use a needle nose pliers to pull the limit stop tab (see Figure 18).
3. Rotate the limit stop to its new position.
4. Reposition between the setpoint cam gear teeth. Do not pull the limit stop any more than necessary to clear the gear teeth.
5. Repeat with second limit stop tab.

**NOTE:** Changing the limit stop position one gear tooth changes the limit stop setting by 1-1/3°F (0.7°C).

---

### Thermostat Calibration

The thermostat is factory calibrated to a control pressure of 7.5 psi (52 kPa) when the setpoint and the ambient temperature are both at 72°F (22°C). No adjustments are required if these settings are appropriate.

If the thermostat has been tampered with, the sensitivity changed, or it is out of adjustment, recalibrate the instrument.

The output pressure test port (see Figure 18) is accessible without removing the thermostat cover through the eighth opening:

**NOTE:** For one-pipe thermostats, the test port is on the *right* side.

For two-pipe thermostats, the test port is on the *left* side.



**CAUTION:**

If you use the wrong test port, thermostat damage can occur and result in replacement of the device.

---

Before calibrating the thermostat, determine what dead band output pressure is desired by using the midpoint between the heating and cooling valve spring ranges. For example, if the heating valve spring range is 2 to 6 psi (15 to 40 kPa) and the cooling valve spring range is 10 to 14 psi (70 to 95 kPa), the midpoint is 8 psi (55 kPa). The determined output pressure is the control pressure required for the calibration of the heating and cooling elements.

To calibrate the TH193 HC Hesitation Thermostat, perform the following tasks in the order shown:

1. Calibrate the cooling element per *Cooling Calibration*.
  2. Calibrate the heating element per *Heating Calibration*.
  3. Adjust the dead band output pressure per *Dead Band Output Pressure Adjustment*.
-



---

**Free Energy Band™  
TH193 HC  
Heating/Cooling  
Room Thermostat,  
Continued****Cooling Calibration**

1. Verify that the room temperature is between 70°F and 80°F (21°C and 27°C).
2. Remove the cover using the Cover screw and calibration wrench.
3. Verify that the supply pressure is 18 psi to 25 psi (124 kPa to 172 kPa). Set the cooling dial (right) to the room temperature by turning the exposed adjustment knob. Allow the thermostat to stand for about five minutes to adjust to the new setting.
4. Moisten the needle and insert the test gauge and needle adapter in the cooling test port (see Figure 18). Read the control pressure.
5. If the control pressure does not read 7 psi to 8 psi (48 kPa to 55 kPa), turn the calibration screw (see Figure 18) using the Cover screw and calibration wrench or a 1/8-inch wrench as follows:
  - If less than 7 psi to 8 psi (48 kPa to 55 kPa), turn the calibration screw clockwise.
  - If greater than 7 psi to 8 psi (48 kPa to 55 kPa), turn the calibration screw counterclockwise.
6. Remove the wrench and let the pressure stabilize.
7. Verify that the pressure is between 7 psi to 8 psi (48 kPa to 55 kPa).

The cooling calibration is now complete. Proceed to *Heating Calibration*.

---

**Heating Calibration**

1. Verify that the room temperature is between 70°F and 80°F (21°C and 27°C).
2. Verify that the supply pressure is 18 psi to 25 psi (124 kPa to 172 kPa). Set the heating dial (left) to the room temperature by turning the exposed adjustment knob. Allow the thermostat to stand for about five minutes to adjust to the new setting.
3. Repeat *Cooling Calibration* steps 4 through 7.

The heating calibration is now complete. Proceed to *Dead Band Output Pressure Adjustment*.

---

**Dead Band Output  
Pressure Adjustment**

1. Set the heating dial (left) to the minimum temperature and the cooling dial (right) to the maximum temperature.
2. Adjust the relief valve using a screwdriver until the control pressure is at the dead band output pressure (see Figure 18):
  - Adjust counterclockwise to increase pressure.
  - Adjust clockwise to decrease pressure.
3. Set the heating and cooling dials to the desired set points. The dead band is between these two set points.
4. Replace the thermostat cover and tighten the two screws.

The thermostat is now in calibration, and the setpoint can be changed to the desired room temperature.

---

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**Free Energy  
Band™ TH193 HC  
Heating/Cooling  
Room Thermostat,  
Continued**

**Troubleshooting**

Before troubleshooting the thermostat per Table 2, make certain there is clean dry supply air at 18 psi (cooling) or 25 psi (heating) (124 or 172 kPa).

Use the Dual Scale Pressure Gauge and Pressure Tap Needle to measure the control pressure at the output test port (see Figure 18). The output pressure test port is accessible without removing the thermostat cover through the eighth opening from the top as follows:

**NOTE:** For one-pipe thermostats, the test port is on the *right* side.  
For two-pipe thermostats, the test port is on the *left* side.



**CAUTION:**

If you use the wrong test port, thermostat damage can occur and result in replacement of the device.

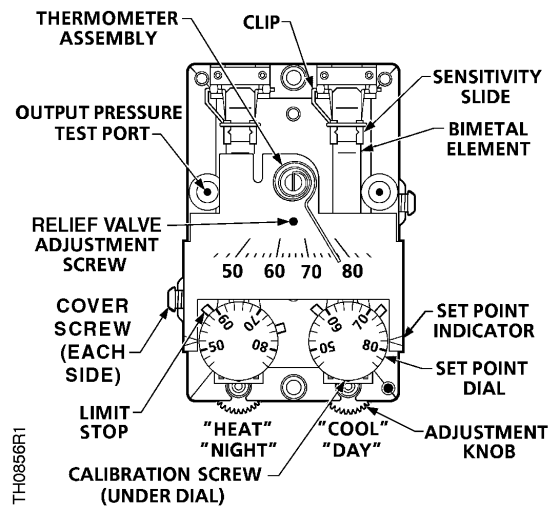
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**Free Energy Band™ TH193 HC Hesitation Room Thermostat, Required Tools**

- Small, flat-blade screwdriver (not included)
- Needle nose pliers
- Cover Screw and Calibration Wrench
- Dial Thermometer
- Dual Scale Pressure Gauge and Pressure Tap Needle, assembled

**Thermometer Calibration**

1. Verify that the room temperature is between 70°F and 80°F (21°C and 27°C).
2. Remove the thermostat cover using the Cover screw and calibration wrench.
3. Place a screwdriver in the center of the thermometer assembly (see Figure 19). Carefully rotate the thermometer assembly until the pointer tip indicates the correct room temperature.



**Figure 19. Free Energy Band TH193 HC Hesitation Thermostat Details.**

**NOTE:** Do not breathe on or touch the bi-metal element, to avoid influencing the temperature reading.

**Sensitivity Adjustment**

The factory thermostat sensitivity setting is approximately 2.5 psi/°F (31 kPa/°C). To change the sensitivity, use a flat-blade screwdriver to carefully move the sensitivity slide (see Figure 19) to the desired position as follows:

Graduation closest to the rigid end of the bi-metal element  
 4 psi/°F (50 kPa/°C)



Graduation closest to the minimum (MIN) end of the bi-metal element  
 1 psi/°F (12 kPa/°C)



**CAUTION:**

Thermostats must be recalibrated whenever sensitivity is changed.

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## Free Energy Band™ TH193 HC Hesitation Room Thermostat, Continued

### Limit Stop Adjustment

Thermostat limit stops define the minimum and maximum thermostat setpoints. The limit stops engage in the setpoint cam gear teeth and cause interference between the set point cam gear and the adjustment knob gear.

To change the limit stop settings:

1. If not already done, remove the thermostat cover using the Cover screw and calibration wrench.
2. Use a needle nose pliers to pull the limit stop tab (see Figure 19).
3. Rotate the limit stop to its new position.
4. Reposition between the setpoint cam gear teeth. Do not pull the limit stop any more than necessary to clear the gear teeth.
5. Repeat with second limit stop tab.

**NOTE:** Changing the limit stop position one gear tooth changes the limit stop setting by 1-1/3°F (0.7°C).

---

### Thermostat Calibration

The thermostat is factory calibrated to a control pressure of 7.5 psi (52 kPa) when the setpoint and the ambient temperature are both at 72°F (22°C). No adjustments are required if these settings are appropriate.

If the thermostat has been tampered with, the sensitivity changed, or it is out of adjustment, use the following steps to recalibrate the instrument.

The output pressure test port (see Figure 19) is accessible without removing the thermostat cover through the eighth opening:

**NOTE:** For Free Energy Band TH193 HC Hesitation Thermostats, the port is on the *left* side.



**CAUTION:**

If you use the wrong test port, thermostat damage can occur and result in replacement of the device.

---

Before calibrating the thermostat, determine what dead band output pressure is desired by using the midpoint between the heating and cooling valve spring ranges. For example, if the heating valve spring range is 2 psi to 6 psi (15 kPa to 40 kPa) and the cooling valve spring range is 10 psi to 14 psi (70 kPa to 95 kPa), the midpoint is 8 psi (55 kPa). The determined output pressure is the control pressure required for the calibration of the heating and cooling elements.

To calibrate the TH193 HC Hesitation Thermostat, perform the following tasks in the order shown:

1. Calibrate the cooling element per *Cooling Calibration*.
  2. Calibrate the heating element per *Heating Calibration*.
  3. Adjust the dead band output pressure per *Dead Band Output Pressure Adjustment*.
-

---

**Cooling Calibration**

1. Verify that the room temperature is between 70°F and 80°F (21°C and 27°C).
2. If not already done, remove the cover using the Cover screw and calibration wrench.
3. Verify that the supply pressure is 18 psi to 25 psi (124 kPa to 172 kPa). Set the cooling dial (right) to the room temperature by turning the exposed adjustment knob. Allow the thermostat to stand for about five minutes to adjust to the new setting.
4. Rotate the adjustment screw clockwise to open the relief valve to maximum. Allow the thermostat to stand for about five minutes to adjust to the new setting.
5. Moisten the needle and insert the test gauge and needle adapter in the test port (see Figure 19). Read the control pressure.
6. If the control pressure does not read the required dead band output pressure, turn the calibration screw (see Figure 19) using the Cover screw and calibration wrench or a 1/8-inch wrench as follows:
  - If less than the required pressure, turn the calibration screw clockwise.
  - If greater than the required pressure, turn the calibration screw counterclockwise.
7. Remove the wrench and let the pressure stabilize.
8. Verify that the pressure is correct.

The cooling calibration is now complete. Proceed to *Heating Calibration*.

---

**Heating Calibration**

1. Verify that the room temperature is between 70°F and 80°F (21°C and 27°C).
2. Verify that the supply pressure is 25 psi (172 kPa). Set the heating dial (left) to the room temperature by turning the exposed adjustment knob. Allow the thermostat to stand for about five minutes to adjust to the new setting.
3. Moisten the needle and insert the test gauge and needle adapter in the output pressure test port (see Figure 19). Read the control pressure.
4. Rotate the adjustment screw counterclockwise to close the relief valve until the pressure is at least 5 psi (35 kPa) higher than the desired dead band output pressure. Allow the thermostat to stand for about five minutes to adjust to the new setting.
5. Set the heating dial to room temperature by turning the exposed adjustment knob. Allow the thermostat to stand for about five minutes to adjust to the new setting.
6. Repeat *Cooling Calibration* steps 6 through 8.

The heating calibration is now complete. Proceed to *Dead Band Output Pressure Adjustment*.

---

## Free Energy Band™ TH193 HC Hesitation Room Thermostat, Continued

### Dead Band Output Pressure Adjustment

1. Set the heating dial (left) to the minimum temperature and the cooling dial (right) to the maximum temperature.
2. Adjust the relief valve using the Cover screw and calibration wrench until the control pressure is at the dead band output pressure (see Figure 19):
  - Adjust counterclockwise to increase pressure.
  - Adjust clockwise to decrease pressure
3. Set the heating and cooling dials to the desired setpoints. The dead band is between these two setpoints.
4. Replace the thermostat cover and tighten the two screws.

The thermostat is now in calibration, and the setpoint can be changed to the desired room temperature.

### Troubleshooting

Before troubleshooting the thermostat per Table 2, make certain there is clean dry supply air at 18 psi to 25 psi (124 kPa to 172 kPa).

Use the Dual Scale Pressure Gauge and Pressure Tap Needle to measure the control pressure at the output test port (see Figure 19). The output pressure test port is accessible without removing the thermostat cover through the eighth opening from the top.

**NOTE:** For Free Energy Band TH193 HC Hesitation Thermostats, the test port is on the *left* side.



#### **CAUTION:**

If you use the wrong test port, thermostat damage can occur and result in replacement of the device.

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## TP970-TP973 Pneumatic Thermostats

### INSTALLATION INSTRUCTIONS

### INSTALLATION

These instructions cover mounting the thermostat to a wall without additional hardware. For replacement of existing competitive and older Honeywell thermostats, use the appropriate adapter kit and follow instructions packed with kit.

### Installation Tools

The following tools will be useful during calibration check and cover installation:

Part No.	Description (Fig. 1)
305965	Gage, 0 to 30 psi (0 to 207 kPa)
CCT729A	Gage Adapter for thermostats with gage tap fitting
CCT735A	Thermostat Tool

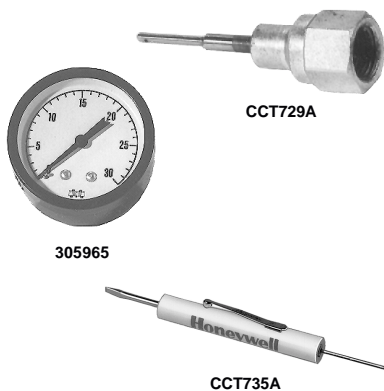
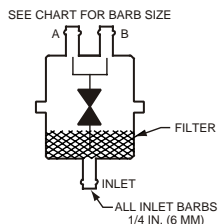


Fig. 1. Thermostat installation tools.

### Remote Restrictors

When remote restrictors are required, (one pipe TP973) select from Figure 2.



REMOTE RESTRICTORS

Part No.	Orifice Size in inches	Body Color	Barb Size in inches (MM)	
			A	B
14002913-	0.005	Blue	1/4 (6)	5/32 (4)
-001*			5/32 (4)	5/32 (4)
-004	0.005	Blue	5/32 (4)	5/32 (4)

\* One Barb Cap 14003567-001 Furnished with Restrictor

C3931-1

Fig. 2. Remote restrictors.

### Piping

Use 5/32-in. O.D. polyethylene tubing. Connect main and branch lines to the backplate, connecting main to the left side barb fitting as viewed from the back and branch to the right side barb. Leave the third (lower) fitting open, except for a three-pipe TP971 Thermostat.

### Mounting

See Figure 3. If mounting on other than a hollow wall, see Installation Instructions 95-5597.



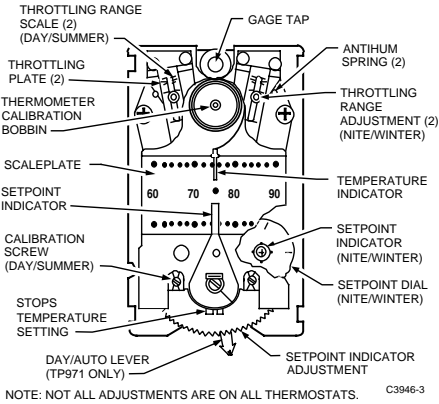


Fig. 3. Installing TP970-TP973 without wall box.

### Throttling Range

Throttling ranges (TR) are factory set at 4F (2K) and should not require any change under normal operating conditions.

If a change in throttling range is necessary, reset the throttling range to the values specified on the job drawings. Use the following procedures:

1. Remove stat cover and install 0 to 30 psi (0 to 207 kPa) gage in gage tap (Fig. 4)
2. Slide the TR indicator to the desired position on the TR scale.
3. Mechanically check the TR by moving setpoint lever to determine the difference in setpoint indication when the branchline pressure reads 3 psi (21 kPa) and 13 psi (91 kPa). (It may be necessary to turn the calibration screw to adjust TR into the stat range.)
4. Reset TR to within  $\pm 2F$  ( $\pm 1K$ ) of required setting for accurate control.
5. Follow RECALIBRATION procedures.

### ADJUSTMENTS

After installation, set the thermostat to the desired setpoint and let the system operate long enough to stabilize. The length of time required for stabilization depends on system response time. This could be only a few minutes or as long as several hours. Make certain that the system has stabilized before checking calibration. If the temperature stabilizes within one-half of the throttling range of the setpoint, no calibration is required.

NOTE: All thermostats are accurately factory calibrated and should require only a calibration (bleed-off) check to ensure correct operation.

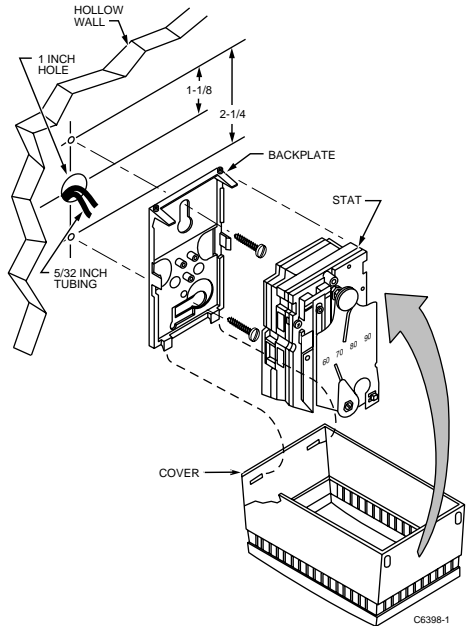


Fig. 4. TP971 and TP972A2218 controls and indicators. Front view—cover off.



## Calibration Check

To check calibration, the control space temperature must be within the scale range of the thermostat.

On direct-acting bimetal elements:

1. Turn setpoint down five degrees below actual room temperature and allow thermostat to build up branchline pressure.
2. Turn setpoint indicator (Fig 4) up slowly.
3. If thermostat begins to bleed off between 1F (0.5C) and 3F (1.5C) below room temperature, no further calibration is necessary.

On reverse-acting, bimetal elements:

1. Turn setpoint up five degrees above actual room temperature as measured by a test thermometer, and allow thermostat to build up branchline pressure.
2. Turn down setpoint indicator (Fig. 4) slowly.
3. If thermostat begins to bleed off between 1F (0.5C) and 3F (1.5C) above room temperature, no further calibration is necessary.

## Calibration



### CAUTION

The thermostat is very sensitive and should not be heated by excessive handling during calibration.

NOTE: Reference in the following procedures to a 30 psi gage implies the gage and gage adapter listed in INSTALLATION TOOLS section.

### TP970

1. Remove the thermostat cover and install a 30 psi gage into the gage tap.
2. Set the temperature setpoint indicator at the indicated temperature.
3. Turn the calibration screw (see Fig. 4) until the gage reads 0 psi.
4. Turn the calibration screw in the opposite direction until the gage reads 8 psi (56 kPa) plus or minus 1 psi (7 kPa). The thermostat is now calibrated.
5. Remove the gage and replace cover.

### TP971

1. Remove the thermostat cover and install a 30 psi gage into the gage tap.
2. Set the temperature setpoint indicator at the indicated temperature.
3. With 13 psi (91 kPa) (DAY) main air pressure, turn the DAY (left) calibration screw (see Fig. 4) until the gage reads 0 psi.
4. Turn the calibration screw in the opposite direction until the gage reads 8 psi (56 kPa) plus or minus 1 psi (7 kPa).
5. With 18 psi (126 kPa) (NITE) main air pressure, rotate the night setpoint dial until its setting agrees with the indicated temperature.
6. Repeat Steps 2, 3, and 4 using the NITE setpoint and (right) calibration screw. The thermostat is now in calibration.
7. Remove the gage and replace cover.

### TP972

1. Remove the thermostat cover and install a 30 psi gage into the gage tap.
2. Set the temperature setpoint indicator to the indicated temperature.
3. With 13 psi (91 kPa) (SUMMER) main air pressure, turn the SUMMER (left) calibration screw (see Fig. 4) until the gage reads 0 psi.
4. Turn the calibration screw in the opposite direction until the gage reads 8 psi (56 kPa) plus or minus 1 psi (7 kPa).
5. With 18 psi (126 kPa) (WINTER) main air pressure, repeat Steps 3 and 4, using the WINTER (right) calibration screw. The thermostat is now in calibration.
6. Remove the gage and replace the cover.

### TP973

Same as TP970.

**Honeywell**

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## Thermostats pneumatiques TP970-TP973

### NOTICE D'INSTALLATION

### INSTALLATION

La présente notice d'installation explique comment installer un thermostat au mur sans ajout de matériel additionnel. Pour le remplacement de thermostats de la concurrence déjà installés, utiliser la trousse d'adaptation adéquate et suivre les directives qui accompagnent la trousse.

### Outils d'installation

N° de pièce	Description (Fig. 1)
305965	Manomètre, 0 à 30 psi (0 à 207 kPa)
CCT729A	Adaptateur de manomètre pour thermostats avec raccord pour prise de manomètre
CCT735A	Outil pour thermostat

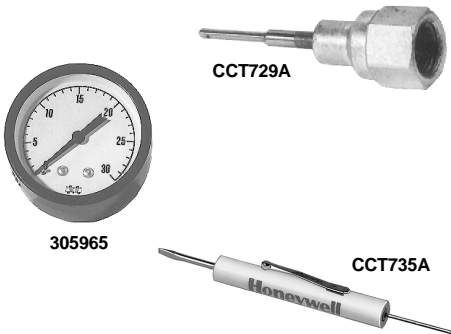
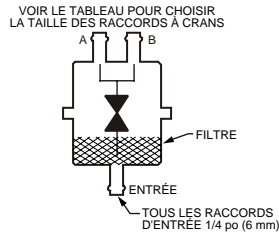


Fig. 1. Outils pour l'installation du thermostat.

### Restricteurs à distance

Lorsqu'il faut utiliser des restricteurs (TP973 à un tuyau), les choisir à partir de la Fig. 2.



RESTRICTEURS À DISTANCE

N° DE PIÈCE 14002913-	TAILLE DE L'ORIFICE EN PO	COULEUR DU CORPS	TAILLE DU RACCORD À CRANS EN PO (MM)	
			A	B
-001*	0,005	Blue	1/4 (6)	5/32 (4)
-004	0,005	Blue	5/32 (4)	5/32 (4)

\* UN BOUCHON À CRANS 14003567-001 FOURNI AVEC LE RESTRICTEUR.

CF3931-1

Fig. 2. Restricteurs à distance.

### Canalisations

Utiliser du tuyau de polyéthylène de 5/32 po de diamètre extérieur. Raccorder les canalisations principales et secondaires à la plaque-support en raccordant la canalisation principale au côté gauche de raccord à crans tel que vu de l'arrière, et la canalisation secondaire au côté droit du raccord à crans. Laisser le troisième raccord libre (celui du bas), sauf si le thermostat installé est un TP971.

### Montage

Voir la Fig. 3. Si l'installation est effectuée sur un mur qui n'est pas creux, consulter la notice d'installation 95-5597.



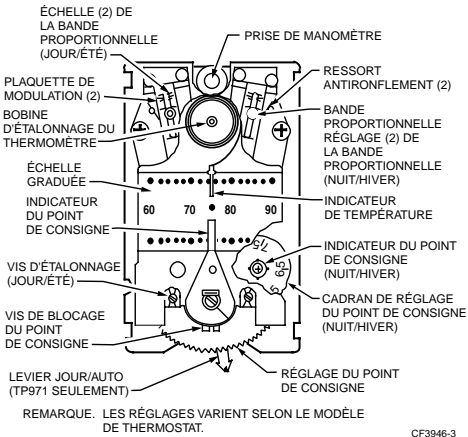


Fig. 3. Indicateurs et leviers de réglage des TP971 et TP972A2218, vu du devant sans couvercle.

## AJUSTEMENTS

Après l'installation, régler le thermostat au point de consigne voulu et laisser le système fonctionner assez longtemps pour qu'il se stabilise. Le temps écoulé avant que le thermostat se stabilise dépend du temps de réaction du système. Il peut s'écouler seulement quelques minutes ou jusqu'à plusieurs heures. S'assurer que le thermostat est stable avant de vérifier l'étalonnage. Si la température se stabilise à la moitié de la bande proportionnelle du point de consigne, aucun étalonnage n'est requis.

**REMARQUE.** Tous les thermostats sont étalonnés en usine avec précision et ne devraient nécessiter qu'une vérification (avec purge) de leur étalonnage pour qu'on s'assure de leur bon fonctionnement.

## Bande proportionnelle

La bande proportionnelle (BP) est réglée en usine à 4°F (2,2°C) et ne devrait pas nécessiter de modification en conditions normales de fonctionnement.

S'il faut toutefois modifier la bande proportionnelle, suivre les étapes ci-dessous pour remettre la bande proportionnelle aux valeurs indiquées dans les plans. Procéder comme suit :

1. Retirer le couvercle et installer un manomètre de 0 à 30 psi (0 à 207 kPa) dans la prise de manomètre (Fig. 3).
2. Faire glisser le curseur de la bande proportionnelle à la valeur désirée.
3. Vérifier mécaniquement la bande proportionnelle en déplaçant le réglage du point de consigne jusqu'à ce que la pression de la canalisation principale soit de 3 psi (21 kPa). Prendre note du point de consigne. Déplacer ensuite le réglage du point de consigne jusqu'à ce que la pression de la canalisation principale soit à 13 psi (91 kPa) et noter le réglage du point de consigne. La différence entre les deux points de consigne correspond à la bande proportionnelle réelle. (Il sera peut-être nécessaire de tourner le vis d'étalonnage pour régler la bande proportionnelle selon la gamme de température du thermostat).
4. Réétalonner le thermostat à plus ou moins 2°F (1°C) du point de consigne requis pour assurer une régulation précise.
5. Suivre les étapes décrites à la section Réétalonnage.

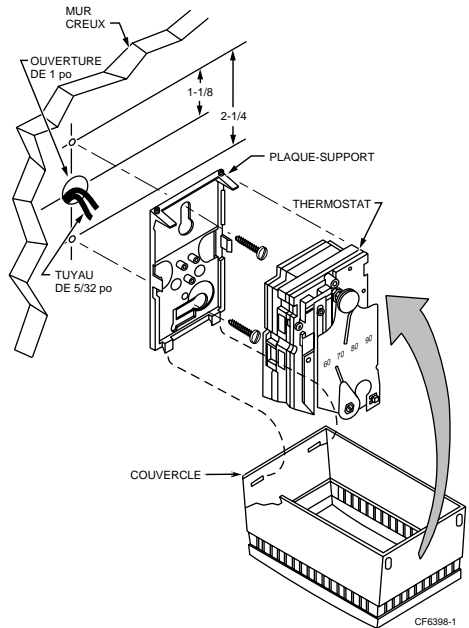


Fig. 4. Installation d'un TP970-TP973 sans boîte murale.

## Vérification de l'étalonnage

Pour vérifier l'étalonnage, la température de l'espace à régler doit se situer dans les limites de la gamme de température du thermostat.

S'il s'agit d'un thermostat à bilames à action directe :

1. Réduire le point de consigne de cinq degrés sous la température ambiante actuelle et permettre au thermostat d'accumuler la pression dans la canalisation secondaire.
2. Augmenter tranquillement le réglage du point de consigne (Fig. 3).
3. Si le thermostat commence à purger l'air entre 1 et 3 degrés F (0,5 et 1,5 degré C) de moins que la température ambiante, il n'est pas nécessaire de réétalonner le thermostat.

S'il s'agit d'un thermostat à bilames à action inverse :

1. Augmenter le point de consigne de cinq degrés au-dessus de la température ambiante actuelle et permettre au thermostat d'accumuler la pression dans la canalisation secondaire.
2. Réduire tranquillement le réglage du point de consigne (Fig. 3).
3. Si le thermostat commence à purger l'air entre 1 et 3 degrés F (0,5 et 1,5 degré C) de plus que la température ambiante, il n'est pas nécessaire de réétalonner le thermostat.

## Réétalonnage



### MISE EN GARDE

Le thermostat est très sensible et ne doit pas être réchauffé par des manipulations excessives pendant l'étalonnage.

**REMARQUE.** Dans les paragraphes qui suivent, les références à un manomètre de 30 psi (207 kPa) signifient le manomètre avec adaptateur énuméré dans le tableau du matériel requis.

## TP970

1. Retirer le couvercle et installer un manomètre de 30 psi (207 kPa) dans la prise de manomètre.
2. Régler l'indicateur de point de consigne à la température indiquée.
3. Faire tourner la vis d'étalonnage (Fig. 3) jusqu'à ce que le manomètre indique 0 psi (0 kPa).
4. Faire tourner la vis d'étalonnage dans le sens opposé jusqu'à ce que le manomètre indique 8 psi  $\pm$  1 psi (56 kPa  $\pm$  7 kPa). Le thermostat est maintenant étalonné.
5. Retirer le manomètre et remettre le couvercle.

## TP971

1. Retirer le couvercle et installer un manomètre de 30 psi (207 kPa) dans la prise de manomètre.
2. Faire tourner l'indicateur du point de consigne jusqu'à ce qu'il marque la température indiquée.
3. Avec une pression d'air de jour à la canalisation principale de 13 psi (91 kPa), faire tourner la vis d'étalonnage de jour (à gauche) (Fig. 3) jusqu'à ce que le manomètre indique 0 psi (0 kPa).
4. Faire tourner la vis d'étalonnage dans le sens opposé jusqu'à ce que le manomètre indique 8 psi  $\pm$  1 psi (56 kPa  $\pm$  7 kPa).
5. Avec une pression d'air de nuit à la canalisation principale de 18 psi (126 kPa), faire tourner le cadran de réglage du point de consigne de nuit jusqu'à ce que le réglage corresponde à la température indiquée.
6. Répéter les étapes 2, 3 et 4 en utilisant la vis d'étalonnage de nuit (à droite). Le thermostat est maintenant étalonné.
7. Retirer le manomètre et remettre le couvercle.

## TP972

1. Retirer le couvercle et installer un manomètre de 30 psi (207 kPa) dans la prise de manomètre.
2. Faire tourner l'indicateur du point de consigne jusqu'à ce qu'il marque la température indiquée.
3. Avec une pression d'air d'été à la canalisation principale de 13 psi (91 kPa), faire tourner la vis d'étalonnage de gauche (ÉTÉ) (Fig. 3) jusqu'à ce que le manomètre indique 0 psi (0 kPa).
4. Faire tourner la vis d'étalonnage dans le sens opposé jusqu'à ce que le manomètre indique 8 psi  $\pm$  1 psi (56 kPa  $\pm$  7 kPa).
5. Avec une pression d'air d'hiver à la canalisation principale de 18 psi (126 kPa), répéter les étapes 3 et 4 en utilisant la vis d'étalonnage de droite (HIVER). Le thermostat est maintenant étalonné.
6. Retirer le manomètre et remettre le couvercle.

## TP973

Voir les directives du TP970.

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## T-4002 Room Thermostat

The T-4002 Room Thermostat is a single temperature controller that provides a proportional output air signal to modulate pneumatic controlled devices in response to a temperature change.

### Models

Action	Mounting	T-4002 Suffix
Direct	Horizontal	-8008
Reverse	Horizontal	-8009

### Specifications

Supply Pressure	91 to 175 kPa (13 to 25 PSIG); Nominal 140 kPa (20 PSIG) Air Supply Must Be Clean, Dry, and Oil Free
Sensitivity	Adjustable from 9 to 50 kPa/°C (.75 to 4 PSI/°F); Factory Set at 31 kPa/°C (2.5 PSI/°F)
Air Consumption	5.5 mL/s (20 SCIM)
Output Flow Capacity	109 mL/s (400 SCIM)
Ambient Temp Limits	-29 to 54°C
Air Connections	Barbed Fittings for 5/32 in. O.D. Polytubing

*The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.*

### Factory Calibration

The T-4002 is factory calibrated to send a  $56 \pm 7$  kPa ( $8 \pm 1$  PSIG) output signal when the room temperature is at the setting on the dial. The element (and dial) is calibrated at 140 kPa (20 PSIG) supply. (Dial at 20°C).

### Mounting

**Note: When handling the unit, leave the front of the blisterpack on to protect the instrument until mounting is complete.**

Room thermostats can be connected directly with 5/32 in. O.D. polytubing to barbed fittings on the back of the unit. The fittings are designated "S" for supply and "O" for output. If the installation was roughed in with

1/4 in. polyurethane tubing, use short lengths of black 5/32 in. tubing as couplers to make the connection. Secure the thermostat tight against the mounting bracket with hex head screws on the corners of the unit.

If the installation was roughed in with a plastic terminal connector on the mounting bracket, simply fit the barbed fittings into the terminal connector and secure the thermostat tight against the mounting bracket with the hex head screws on the corners of the unit.

If the thermostat is to be installed on an old T-4000 copper tube pipehead, install two 13 mm long, 5/32 in. pieces of polyurethane tubing on the fittings. Install the thermostat over the pipehead and secure the unit tight against the mounting bracket.

### Set Point Adjustment (See Fig. 2)

1. Furnish 140 kPa (20 PSIG) supply pressure to the instrument.
2. Determine the exact temperature at the element.
3. Turn the set point dial to that temperature.
4. Turn the calibration screw to provide an output pressure equal to the mid spring range of the controlled device.
5. Turn the set point dial to the desired temperature.

### Operational Checkout

1. Furnish 140 kPa (20 PSIG) supply pressure to the instrument.
2. Slowly increase the dial setting.

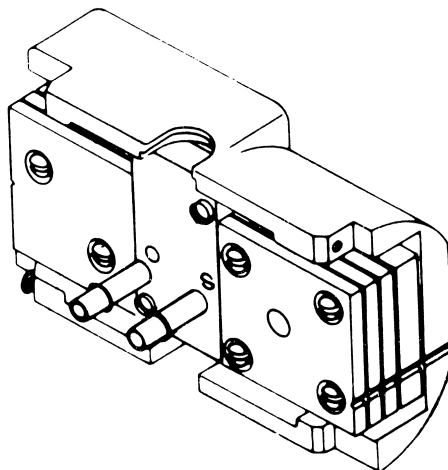


Fig. 1: Back View of Instrument

3. Check for a gradual decrease in output pressure on the direct acting (DIR) model or increase in output pressure on the reverse acting (REV) model.
4. Slowly decrease the dial setting.

Check for a gradual increase in output pressure on the DIR model or decrease in output pressure on the REV model.

6. If a pressure buildup and drop is not observed as mentioned above, refer to Repair Information.

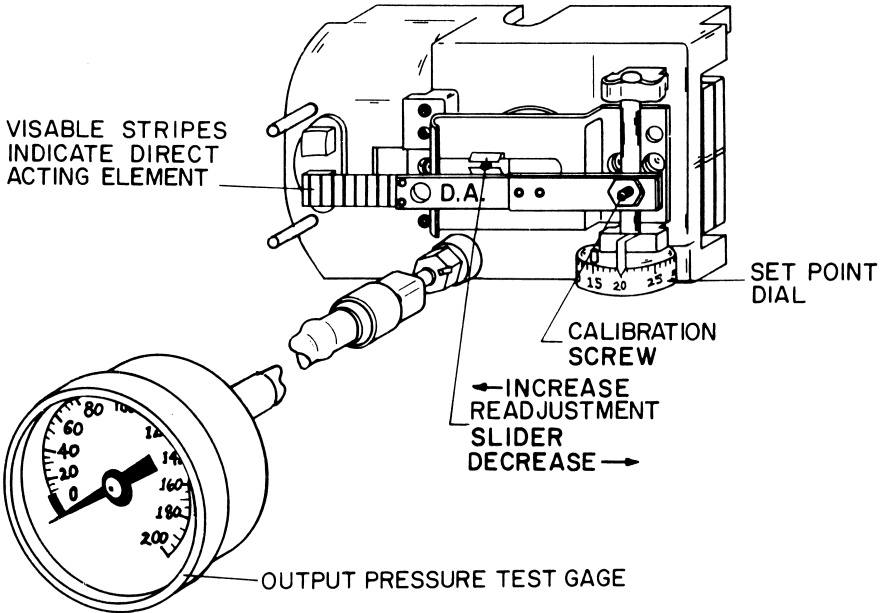


Fig. 2: T-4002 Adjustments

### Sensitivity Adjustment

The T-4002 is factory set at  $31 \pm 6 \text{ kPa/}^\circ\text{C}$  ( $2.5 \pm 0.5 \text{ PSI/}^\circ\text{F}$ ). Some situations may require a sensitivity adjustment for proper control system operation. To do so, move the sensitivity slider to the left to increase or to the right to decrease the sensitivity setting.

If the output pressure changes due to moving the slider, restore the output pressure to its original value by turning the adjustment screw on the slider clockwise to decrease or counterclockwise to increase the pressure.

**Note:** This screw is not intended for set point calibration. Refer to Fig. 2.

### Repair Information

If the T-4002 fails to operate within its specifications, refer to the Repair Parts Manual for appropriate repair parts.

**European Single Point of Contact:**  
JOHNSON CONTROLS  
WESTENDHOF 3  
45143 ESSEN  
GERMANY

**NA/SA Single Point of Contact:**  
JOHNSON CONTROLS  
507 E MICHIGAN ST  
MILWAUKEE WI 53202  
USA

**APAC Single Point of Contact:**  
JOHNSON CONTROLS  
C/O CONTROLS PRODUCT MANAGEMENT  
NO. 22 BLOCK D NEW DISTRICT  
WUXI JIANGSU PROVINCE 214142  
CHINA

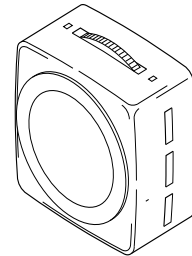


## Pneumatic Two-Pipe Room Thermostats Installation Instructions

### Application

The 2212-118 and 2212-119 Series Pneumatic Room Thermostats are designed for proportional control of pneumatic devices and actuators in environmental control systems. These two-pipe thermostats incorporate a highly sensitive bimetal thermostatic element and a pilot operated relay with pneumatic feedback for accuracy and stability over the entire operating range.

These thermostats have a serrated thumb wheel for setpoint adjustment.



### Specifications

**Action:** Proportional.

**Setpoint Range:** 55 to 85 °F (13 to 29 °C).

**Throttling Range:** 2 to 12 °F, adjustable.

**Supply Air Pressure:** 20 psig.

**Maximum Air Pressure:** 30 psig.

**Main Air Consumption:** 15 scim.

**Calibration Point:** 9 psig branch line pressure when ambient equals setpoint (factory-set).

**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.

**Thermostat requires:** Clean oil free dry air.

Table-1 Model Chart — Thermostats.

Wholesale Number	Replaces Model	Action	Description
2212-118	T18-301	Direct	Includes thermostat, plastic thermostat cover, plastic adjustment cover, standard mounting plate and screws.
2212-119	T19-301	Reverse	

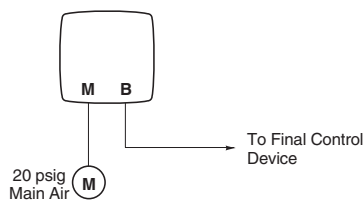


Figure-1 Piping Diagram.

### Accessories

Part Number	Replaces Model	Description
<b>Accessories</b>		
20-660	6-441	Cover screw
20-707	10-53	Metal thermometer guard
20-712	10-59	Internal stop kit
20-715	10-62	Clear cover thermostat guard
21-876	10-76	Opaque cover thermostat guard
21-928		Cover, gray plastic with blank dial
21-930		Cover, white plastic with °F/ °C dial
<b>Calibration</b>		
20-881	N2-4	Thermostat calibration wrench
22-138	MCS-GA	Branch tap gauge adaptor
900-002		Thermostat calibration kit
<b>Installation</b>		
20-850		Thermostat mounting plate
22-021		Universal wall mounting kit
22-022	N5-95	Thermostat conversion kit
22-023		Thermostat conversion kit, white
22-024		Thermostat mount bracket
10-82-SS		Outlet box mounting plate S.S.
21-473		Snap-in drywall mounting

### 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. If such a location is necessary, mount the thermostat on an insulated back plate.
- 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)

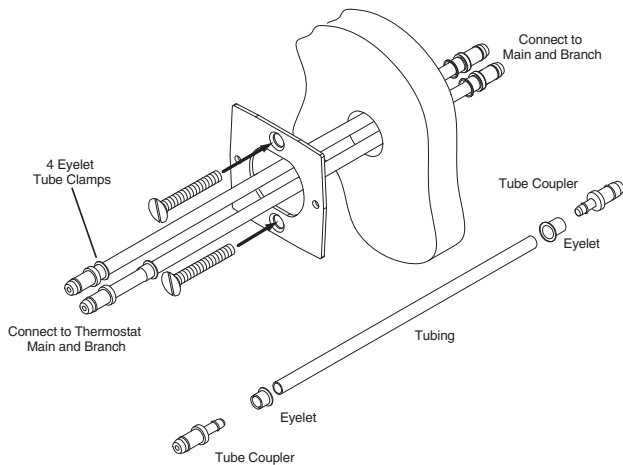


Figure-2

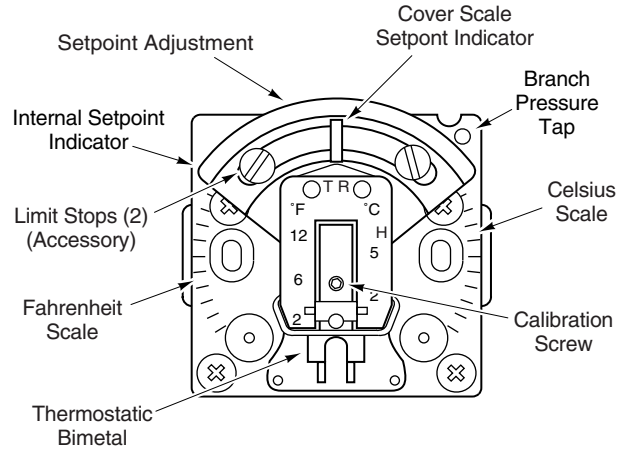
1. Assemble the eyelets and two tube couplers to tubing.
2. Connect the assembly by inserting the tube couplers into existing tubing in the wall (Figure-2). Note which connection is Main and which connection is Branch.
3. Pull tubing through center hole in mounting plate and screw mounting plate to wall 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).
4. Affix thermostat to mounting ring with round head screws, taking care not to kink the tubing.

## Calibration and Throttling Range Setting

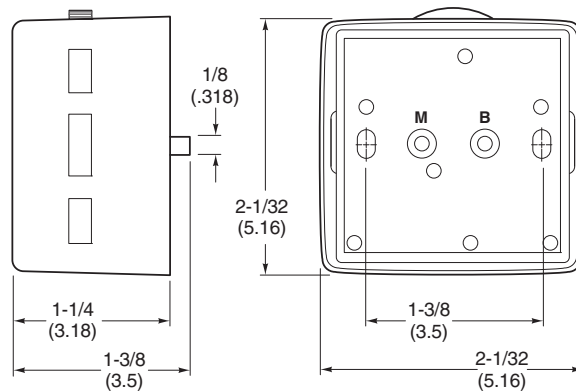
The thermostats are factory calibrated and are shipped with the throttling range set at 3 °F. They should not require calibration upon installation. However, if it is necessary, change the calibration or throttling range setting as follows:

1. Remove the thermostat cover, using a 20-881 thermostat wrench (1/16" hex wrench), 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*.
3. Move the setpoint adjustment to the measured ambient temperature, using the internal setpoint indicator.

4. 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 calibration screw until the branch line pressure indicates 9 psig. Clockwise rotation increases the branch line pressure. Counterclockwise rotation lowers the branch line pressure.
5. Reinstall the thermostat cover and set the thermostat to the desired setpoint.



## Dimensional Data



Dimensions are in inches (mm).

## DEVICE INFORMATION

### Identification

Thermostats of this family may be easily identified by referring to the part number located on the carton and on the back and side of the device.

These thermostats are used for proportional control of pneumatically activated valves, dampers and similar devices in heating, ventilating and air conditioning systems. See Table-1.

### Pre-Installation

The thermostats are shipped with mounting screws and three 3/4-inch long copper tubes. Wall fittings must be ordered separately.

**Air connections:** Two plastic tubes reinforced with a coil spring are coded M & B. The M (Black) designates the supply main and the B (White) designates the controlled branch line.

Model TK-1601 has three plastic tubes. The additional tube A (White) designates the auxiliary (two-position) branch line.

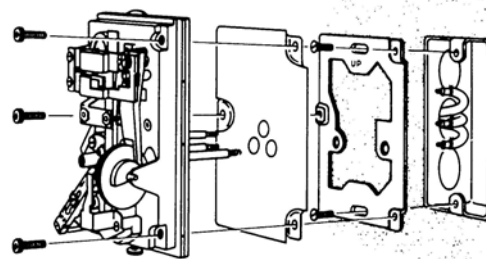
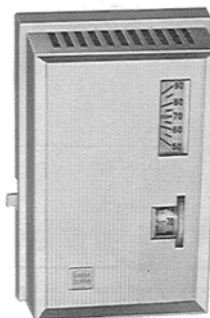


Figure-1 Mounting Thermostat to Electrical Box.

## INSTALLATION

### Requirements

Locate the thermostat where it will be exposed to unrestricted circulation of air which represents the average temperature of the controlled space. Do not locate the thermostat near sources of heat or cold, such as lamps, motors, sunlight, or concealed ducts. Maximum safe ambient temperature is 150 °F (65 °C).

---

*Note:* No fitting is available for use for flush mounting in masonry walls when using the TK-1601, an electrical box is used for this application (Figure-1).

---

**Table-1 Models.**

Part Number	Description and Action *	Dial Range	Factory Setpoint Setting (F)	Throttling Range	Supply Air Pressure
TK-1001	Heating DA	55-85 (°F)	75	Adjustable 2 - 10F°/10 psi 1.1-5.5 C°/69 kPa) Factory Set 4F°/10 psi (2.2 C°/69 kPa)	15 or 20 psig (103.4 or 137.9 kPa)
TK-1001-116		13-29 (°C)			
TK-1101	RA Cooling	55-85 (°F)			
TK-1101-116		13-29 (°C)			
TK-1201	Heating-Cooling DA - 20 psig (137.9 kPa) RA - 15 psig (103.4 kPa)	55-85 (°F)			
TK-1281	Heating-Cooling DA - 15 psig (103.4 kPa) RA - 20 psig (137.9 kPa)				
TK-1301	Day-Night DA				
TK-1301-116	Night - 20 psig (137.9 kPa) Day - 15 psig (103.4 kPa)	13-29 (°C)			
TK-1381	Day-Night RA Night - 20 psig (137.9 kPa) Day - 15 psig (103.4 kPa)	55-85 (°F)			
TK-1601	Day-Night DA Night - 20 psig (137.9 kPa) Day - 15 psig (103.4 kPa)				
*Direct acting: Increases output pressure on temperature rise. Reverse acting: Decreases output pressure on temperature rise.					

Air Consumption: .008 scim (.0021 mL/s) for sizing air compressor (exception: .024 for TK-1601).

Supply in Pressure: See Table-1.

Air Capacity: 16 scim (4.37 mL/s) for sizing air mains (exception: 32 scim (8.74 mL/s) for TK-1601).

Air Connection: 5/32 plastic tubing.

**Procedure**

To mount a thermostat on an electrical switch box. When installing a thermostat to an electrical switch box (Figure-1) in a masonry wall proceed as follows:

1. Attach the mounting plate to the switch box with the two flathead screws provided. Be sure the mounting plate is vertical.
2. Place the fiber board insulator over the tubes on the back of the thermostat.
3. Slightly rotate the tubes back and forth, and push firmly on to the fittings (Figure-3).

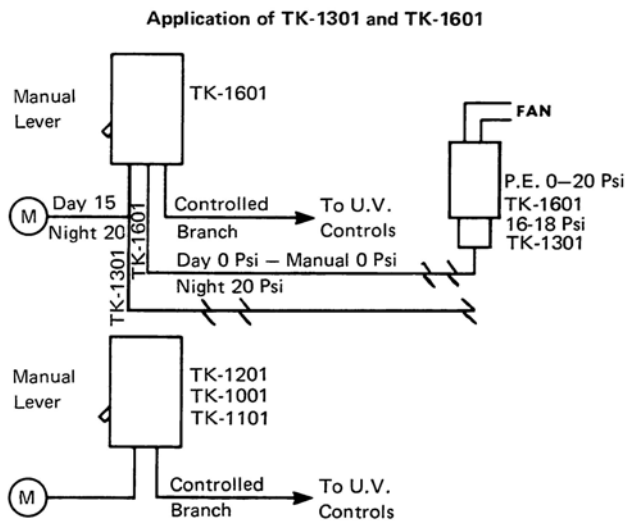


Figure-2

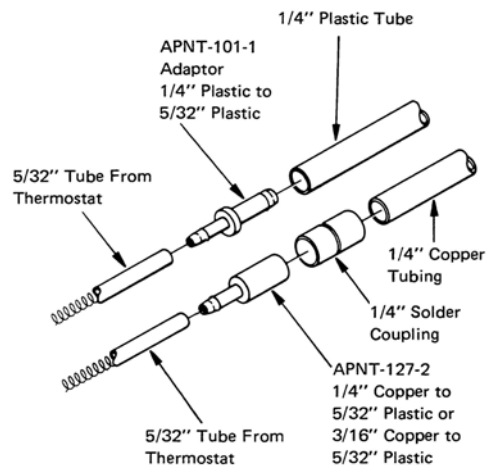


Figure-3

4. Fasten the thermostat to the mounting plate with the Allen head screws provided and tighten evenly.

To mount a thermostat on an AT-507 mortar joint fitting proceed as follows:

1. Remove the screws holding the protector block in place. Pry out and discard the protector block. Pull out and discard the short piece of plastic tubing inserted in the connector head.
2. Attach the thermostat mounting plate to the connector head with the two flathead screws provided. Be sure the mounting plate is vertical.
3. Measure 7/8-inch from the back of the thermostat and cut the tubing at a 45° angle to make the tubing slide into the connector head easily. Remove the coil spring from the tubing and discard.
4. Insert two 3/4-inch lengths of copper tubing, supplied with the thermostat into the plastic tubing to stiffen the plastic tubing so it can be installed easily.
5. Place the fiber board insulator over the tubes on the back of the thermostat.
6. Lubricate the outside of the two plastic tubes (this applies to the mortar joint fitting only) with water or glycerin. Be sure that none of the lubricant gets inside the tubing.
7. Insert the tubes in to the connector head. Slightly rotate the tubes back and forth, and push firmly into the sockets at least 1/4 inch.
8. Fasten the thermostat to the mounting plate with Allen screws provided, and tighten evenly.

## CHECKOUT

After installing the thermostat, verify proper operation as follows:

1. To check the nozzle and/or restriction, turn the setpoint dial to 85°F (30 °C). If the thermostat is direct acting, the output pressure will drop. If the thermostat is reverse acting, the output pressure will rise. Turn the setpoint dial to 55° (12 °C). If the thermostat is direct acting, the output pressure should rise. If the thermostat is reverse acting, the output pressure will drop.

---

*Note:* The amount of the rise or drop in the output pressure may vary depending on the ambient temperature in the test area. If output pressure is always 0, the restriction may be plugged. If output is always equal to supply or unable to decrease below 3 psig (20.7 kPa), the nozzle may be plugged.

---

2. To check for active thermal element, adjust the setpoint knob to obtain approximately 8 psig (55.1 kPa) branch output. Slightly warm the element with your hand or breath. A direct acting thermostat will increase output pressure. A reverse acting thermostat will decrease output pressure. If the thermostat fails to function properly, refer to REPAIR.

## RUN/ADJUST

**Throttling Range:** The throttling range is set at 4F° per 10 psi (2.2 C°/ 69 kPa) control pressure change. It should be set at the lowest value which will allow the thermostat to control the system without cycling under normal load conditions. The most satisfactory setting will vary with the type of system being controlled.

If the throttling range of the thermostat as shipped is not satisfactory, proceed as follows:

1. Measure temperature at sensing element. This should be stable temperature.
2. Rotate setpoint dial to this temperature.
3. With 15 psig (103.4 kPa) supplied to thermostat, adjust calibration screw until 3 psig (20.7 kPa) is read on branch test gauge.
4. Rotate the setpoint dial in a direction which raises the output until 13 psig (89.6 kPa) is read on the branch gauge.
5. The difference between the setpoint dial readings in Step 2 and 4 is the throttling range of the thermostat.
6. If the throttling range in Step 5 is not that desired, move the throttling range slider (Figure-4) in the appropriate direction and repeat Steps 2 through 5 until the desired throttling range is obtained.

The calibration of the thermostat should be checked after the throttling range has been changed.

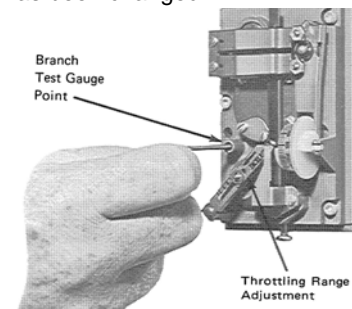


Figure-4

**Calibration:** As a nominal calibration, the branch line control pressure should be 8 psig (55.1 kPa) when the setpoint is equal to the room temperature indicated by an accurate thermometer. On some applications, a value other than 8 psig (55.1 kPa) will be required to get the desired control results. In this case, change the 8 psig (55.1 kPa) designation used in the calibration procedure.

---

**Caution:** The thermal element of the room thermostat is very sensitive to temperature change. Do not affect its temperature by touching the bimetal or breathing on the thermostat. When calibrating the instrument, observe the room temperature frequently and reset and setpoint dial if required.

---

1. Remove the thermostat cover by loosening the cover screw.
2. Using a 5/64-inch Allen wrench, unscrew (counterclockwise rotation) the test point screw one full turn (Figure-4).

3. Attach the test gauge rubber seal to the boss, as shown. Using a rotary motion, push the gauge on as far as it will go (1/4-inch minimum). See Figure-5. The tubing will support the test gauge in a position where it will be easily read. The supply pressure to the thermostat should be 15 psig (103.4 kPa).
4. Adjust the setpoint dial to the room temperature as indicated on the test thermometer.
5. With a 0.48-inch six spline wrench, turn the calibration screw (Figure-6) clockwise if the controlled pressure is above 8 psig (55.1 kPa) and counterclockwise if it below 8 psig (55.1 kPa). Adjust the screw until the controlled pressure is  $8 \pm 1$  psi (55.1  $\pm$ 1 kPa).

---

*Note:* The hex nuts on the calibration screws are tension devices only. They should be loosened to make an adjustment.

---

The TK-1001, and TK-1101 thermostats are now calibrated. Proceed to Step 4 below, Bimetal on TK-1201, 1301 and 1601 is also calibrated. To calibrate bimetal proceed as follows using a special tool AL-80 or a small screwdriver.

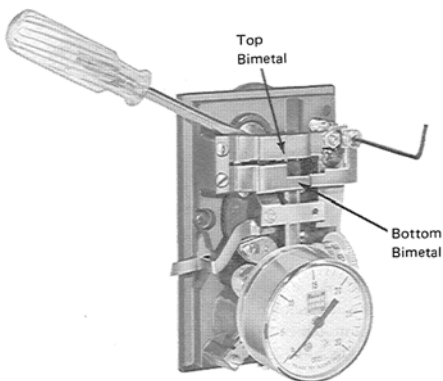


Figure-5

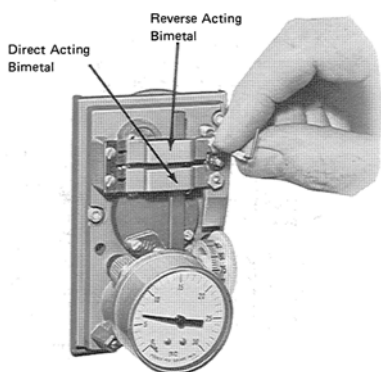


Figure-6

1. Insert the blade of the tool or screwdriver between the switchover plunger and the switchover lever shown in Figure-5. The top bimetal should be approximately 1/32-inch off the lever and the bottom bimetal should be in contact with the lever.
2. With a .048-inch six spline wrench, turn the calibration screw clockwise if the controlled pressure is above 8 psig (55.1 kPa) and counterclockwise if the controlled pressure is below 8 psig (55.1 kPa). Adjust the screw until the pressure is  $8 \text{ psi} \pm 1 \text{ psi}$  (55.1 kPa  $\pm$ 7 kPa).
3. Manually switch the thermostat several times by removing and reinserting the AL-80 or screwdriver and observing the branch line pressure. If it varies beyond the limits, repeat the calibration.
4. Remove the test gauge.
5. Turn the test point screw clockwise to tighten.
6. Replace cover.

## MAINTENANCE

The pneumatic thermostat requires no routine maintenance.

## REPAIR

Field repair of pneumatic thermostats is not recommended. However, if the thermostat output pressure is 0 and it cannot be corrected by calibration, the restriction should be checked. Hold the restriction plate up to the light and check the .0075 hole. If the hole is blocked, the restriction plate must be replaced. the filter should be replaced at the same time. If the hole is not blocked, then the thermostat should be replaced.

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## TH192 S Single Temperature Room Thermostat

### Product Description

The TH192 S thermostats are proportional single output, single set point, 1-pipe (low air capacity) or 2-pipe (high air capacity) temperature controllers. Each TH192 chassis includes a wall plate for thermostat installation using a variety of rough-in installation kits.

### Prerequisites

- Review all instructions before beginning installation.
- Verify job drawings are available to reference specific job site information as needed.
- Verify rough-in installation kits (wall-box or tubing runs) are pre-installed.



### Expected Installation Time

30 Minutes

### Required Tools

- Medium flat blade screwdriver
- Needle nose pliers
- Small level
- Calibration and Cover Screw Wrench or 1/16" Allen wrench (192-632)
- Needle Probe with 1-1/2" diameter, 0 to 30 psig (0 to 200 kPa) test gauge (192-633)

### Installation Conventions

<b>WARNING</b>		Personal injury/loss of life may occur if a procedure is not performed as specified.
<b>CAUTION</b>		Equipment damage, or loss of data may occur if the user does not follow procedure as specified.

### Installation

#### Overview

The TH192 S thermostat and the wall plate mount vertically to a wall using a variety of rough-in installation kits (for example, wall box kits or tubing terminal kits). The ends of the air lines from the rough-in installation kits have terminal adapters that snap into the wall plate. Terminal adapters also are available separately as orderable accessories. (Note that certain retrofit applications allow air connections directly to the thermostat chassis.)

The "S", "R1", and "R2" labels on both the thermostat chassis and the wall plate identify the air line connections. (The TH192 S does not use the "R2" air line connection.) The thermostat plugs into the terminal adapters on the wall plate. The *Piping* section of this document shows typical connections.

Two cover screws plus the latch arms on the wall plate hold the thermostat in place. The cover fits over the thermostat and the two cover screws fasten it to the wall plate.

#### Procedure

The following procedure is for a typical thermostat installation and assumes the rough-in installation kit is in place. See *Figure 1*.

1. The rough-in installation kit provides a supply (blue) air line and a return air line joined by an air link. Remove the terminal adapters from the air link and snap them into the wall plate at their respective locations.
2. Using the mounting screws supplied with the thermostat chassis, install the wall plate on the wall as follows:
  - a. Guide the screws through the slotted key holes on the wall plate and partially insert them into wall.
  - b. Orient the wall plate so that it is square and level.
  - c. Tighten the mounting screws to secure the wall plate in place.
3. Moisten the thermostat supply and return ports to lubricate them. Carefully insert the thermostat ports into the terminal adapter "O" rings on the wall plate.

4. Mount the cover over the thermostat.

**NOTE:** For applications that use the 1/2-inch large set point adjustment knob, align the key hole in the cover over the shaft protruding from the thermostat when mounting the cover.

Use the hex key end of the calibration and cover screw wrench or a 1/16" Allen wrench to tighten the two screws that secure the cover in place.

5. Place the optional 1/2-inch large set point adjustment knob on the shaft protruding through the cover. Use the hex key end of the calibration and cover screw wrench or a 1/16" Allen wrench to tighten the set screw on the knob.

The installation is complete.

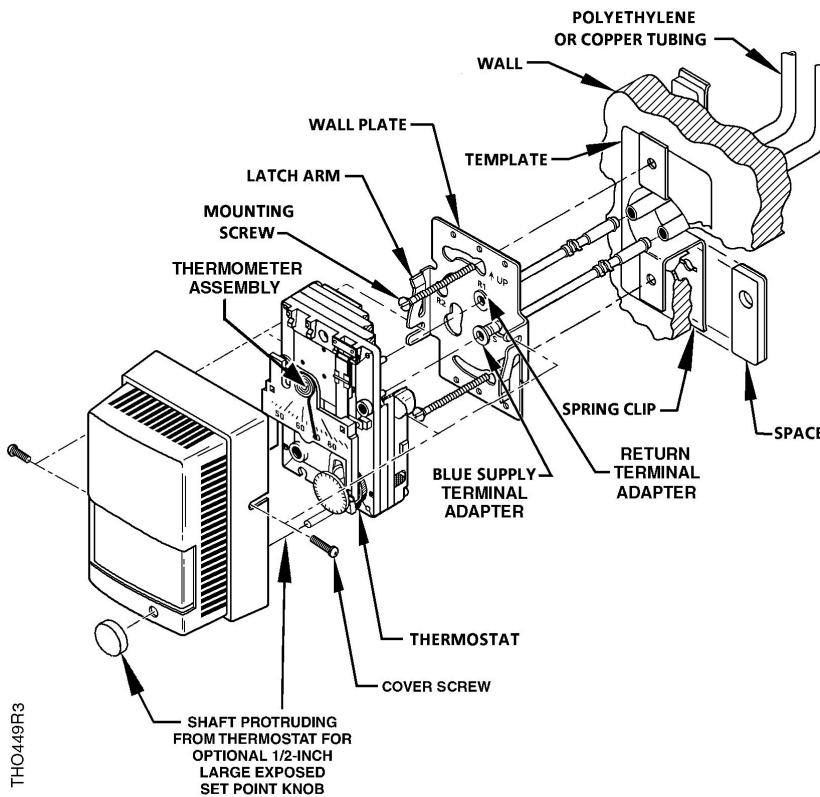
### Remodeling Installation Reference

When converting from a Model TH180 or TH182 to the TH19X, you need:

- TH192 Chassis.
- A new cover. The TH180 or TH182 cover does not fit the TH19X chassis or vice versa.
- Terminal adapters. These adapters are required to retain the plug-in feature only. Otherwise, the 5/32" (4 mm) tubing can connect directly to the thermostat chassis. Use compression rings (part number 141-388) to secure the connections.

When converting from a competitor model to the TH19X, you need:

- TH192 Chassis.
- A new cover.
- Adapter Kit (see TB-214, TH192 Adapter Kits Technical Bulletin, 155-231).



### Piping

**NOTE:** All piping (see Figures 2 and 3) must conform to local codes and regulations and must comply with the local authority having jurisdiction.

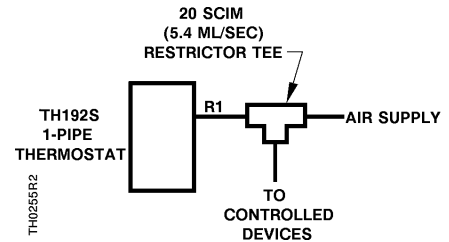


Figure 2. TH192 S One-Pipe Thermostat Connections.

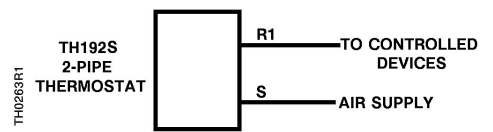


Figure 3. TH192 S Two-Pipe Thermostat Connections.

Figure 1. Thermostat Installation (using 192-481 Tubing Terminal Kit and 182-685 Dry Wall Mounting Kit.)



## Thermometer Calibration

1. Use a test thermometer to read the current room temperature.
2. Place a screwdriver in the center of the thermometer assembly (*Figure 4*). Carefully rotate the thermometer assembly until the pointer tip indicates the correct room temperature.

**NOTE:** Avoid breathing on or touching the bimetal spiral since this affects the temperature reading.

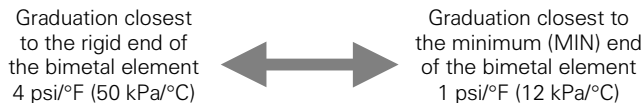
## Limit Stop Adjustment

Thermostat limit stops define the minimum and maximum thermostat set points. The limit stops engage in the set point cam gear teeth and cause interference between the set point cam gear and the adjustment knob gear.

To change the limit stop settings, use a needle nose pliers to pull the limit stop (*Figure 4*) between the set point cam gear teeth. Do not pull the limit stop any more than necessary to clear the gear teeth. Rotate the limit stop to its new position. Changing the limit stop position one gear tooth changes the limit stop setting by 1-1/3°F (0.7°C).

## Sensitivity Adjustment

The factory thermostat sensitivity setting is approximately 2.5 psi/°F (31 kPa/°C). To change the sensitivity, use a flat blade screwdriver to carefully move the sensitivity slide (*Figure 4*) to the desired position as follows:



**NOTE:** If the thermostat sensitivity is adjusted, recalibrate the thermostat.

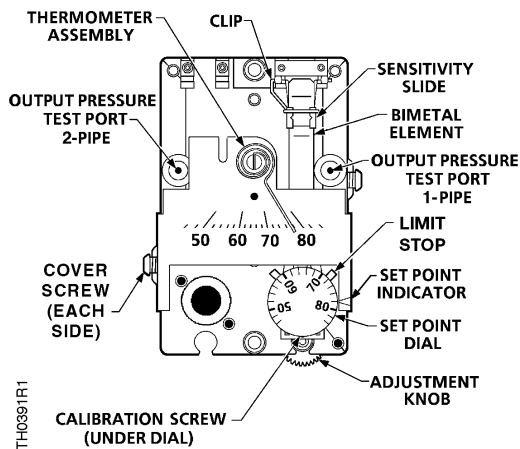


Figure 4. TH192 S Thermostat Details.

## Thermostat Calibration

The thermostat is factory calibrated to a control pressure of 7.5 psi (52 kPa) when the set point and the ambient temperature are both at 72°F (22°C). No adjustments are required if these settings are appropriate.

If the thermostat has been tampered, the sensitivity changed, or it is out of adjustment, use the following steps to recalibrate the instrument.

The output pressure test port (*Figure 5*) is accessible without removing the thermostat cover through the 8th opening:

- For one-pipe thermostats, the test port is on the *right* side.
- For two-pipe thermostats, the test port is on the *left* side.



### CAUTION:

If you use the wrong test port, thermostat damage can occur and result in replacement of the device.

1. Make certain that the air supply is 25-30 psi (172-207 kPa).
2. Remove the cover using the calibration tool. Verify that the room temperature is between 70 and 80°F (21 and 27°C).
3. Verify that the supply pressure is 18 psi (124 kPa). Set the dial to the room temperature by turning the exposed adjustment knob or using a hex key. Allow the thermostat to stand for about five minutes to adjust to the new setting.
4. Moisten the needle and insert the test gauge and needle adapter in the output pressure test port (*Figure 5*). Read the control pressure.
5. If the control pressure does not read 7 to 8 psi (48 to 55 kPa), turn the calibration screw (*Figure 4*) using the calibration tool or a 1/8-inch (3.2 mm) wrench until the pressure is 7 to 8 psi (48 to 55 kPa). The sensing element is now in calibration and the set point can be changed to the desired room temperature.

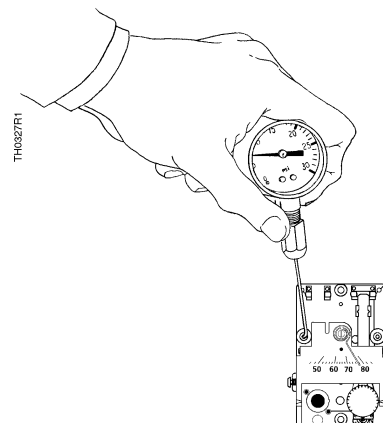


Figure 5. TH192 S Thermostat Output Pressure Test Port.

## Troubleshooting

Before troubleshooting the thermostat per *Table 1*, make certain there is clean dry supply air at 18 psi (124 kPa) minimum. Use the test probe gauge and needle adapter to measure the control pressure at the output test port (*Figure 5*). The output pressure test port is accessible without removing the thermostat cover through the 8th opening from the top as follows:

- For one-pipe thermostats, the port is on the *right* side.
- For two-pipe thermostats, the port is on the *left* side.



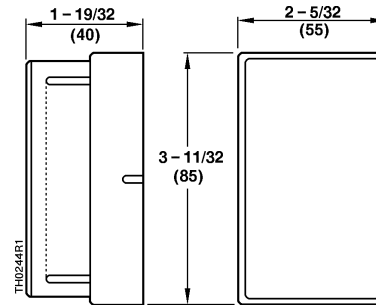
**CAUTION:**

If you use the wrong test port, thermostat damage can occur and result in replacement of the device.

**Table 1. Troubleshooting Guide.**

Problem	Check	Cause	Action
Control pressure stays at approximately zero	Air supply	Low supply pressure	As required
	Nozzle or flapper	Dirt on nozzle or flapper	Clean nozzle or replace thermostat
	Restrictor	Clogged restrictor	Replace restrictor
	Calibration	Out of calibration	Recalibrate
Control pressure stays at approximately supply pressure	Nozzle	Clogged nozzle	Clean nozzle or replace thermostat
	Calibration	Dirt on either supply or exhaust valve seat	Alternately close and open nozzle by gently pushing down the bimetal
Excessive air leakage from exhaust port on left side of thermostat	Supply and return line connection	Connections are interchanged or connection to port is incorrect	As required

## Dimensions



**Figure 6. TH192 S Dimensions in Inches (Millimeters).**

## Reference

Document	Number
TH192-1, TH192 S Single Temperature Room Thermostat Technical Instructions	155-065P25
TB 214, TH192 Adapter Kits Technical Bulletin	155-231
TB 237, Accessories for Installation of TH192, TH193, or TH194 Room Thermostats Technical Bulletin	155-244
Powerstar Thermostat Covers — Color Reference Guide	152-178P10

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