

## T-4000 Series Room Thermostat Adjusting Instructions\*

The T-4000 Series Pneumatic Room Thermostats are factory calibrated to the values specified in Table 1. If these settings are suitable to the application, no adjustments need to be made. If different settings are required, turn the set point dial to the desired value.

If the room temperature is out of control, determine the cause of the problem. Possible causes not involving the thermostat are listed below.

1. Check for proper operation of the controlled device.

2. Check to see if the controlled medium (water, for example) is hot or cold enough to maintain the desired temperature.
3. Check for unusual or extreme loads in the space which may overcome the efforts of the thermostat to maintain control.

If it is determined that the thermostat is out of adjustment, follow the appropriate instructions to recalibrate the instrument.

### Sensitivity Adjustment (See Fig. 1)

All T-4000 series thermostats have an integral output pressure test port. The newer high volume output thermostats have a plug-in test port fitting which accepts a hypodermic needle test probe and gage (X-200-140 and G-2010-11). On older models, the test port cap screw must be removed to accept a screw-in test gage (X-200-19). For these units, a test port fitting (T-4000-615) can be ordered. All low volume output thermostats have hypodermic needle test points. For units that require a screw-in gage, remember to replace the test port cap screw after adjustment.

The sensitivity of the T-4000 series instruments is factory set at 2.5 PSI/F° (32 kPa/C°). It is adjustable from 1 to 3 PSI/F° (13 to 38 kPa/C°) for low volume output thermostats and from .75 to 4 PSI/F° (10 to 51 kPa/C°) for high volume output thermostats. (Sensitivity of the T-4003 is fixed at 2.5 PSI/F°).

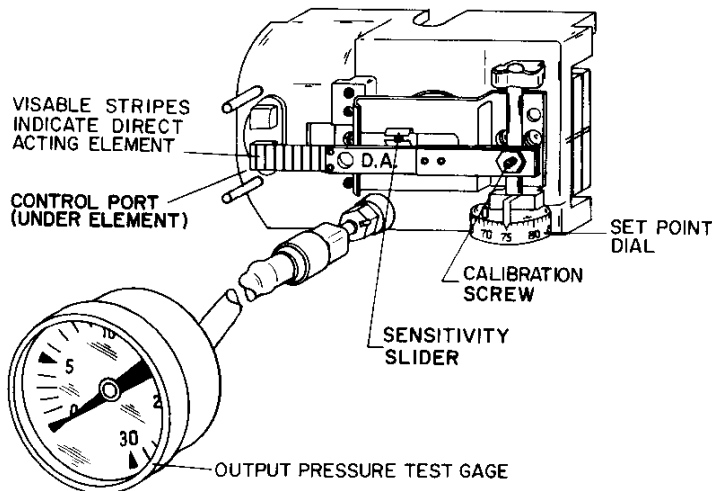
1. Furnish the appropriate supply pressure to the instrument.
2. Insert the appropriate gage.
3. Note the output pressure.  
**Note:** The output pressure for T-4054 thermostats must be within one of the two control ranges (not within the deadband range).
4. For high volume output thermostats, move the sensitivity slider toward the control port to increase or away from the control port to decrease the sensitivity. For low volume output thermostats, move the sensitivity slider down to

**Table 1: Factory Set Points**

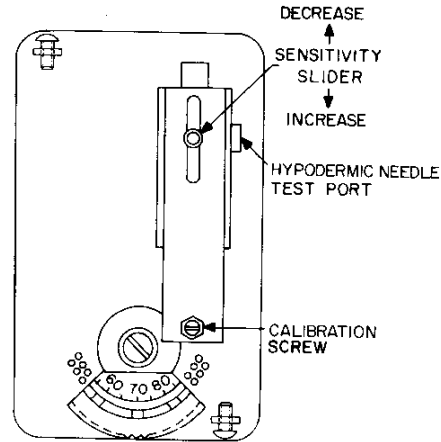
Model		Calibration Setting	Output Pressure PSIG kPa
T-4002		Dial Setting	$\frac{8}{56}$
T-4003		Dial Setting	$\frac{8}{56}$
T-4054 (10F° Deadband)	Htg.	68F	$\frac{4.5}{31.5}$
	Clg.	78F	$\frac{11}{77}$
T-4100		Dial Setting	$\frac{8}{56}$
T-4110		Dial Setting	$\frac{8}{56}$
T-4506	Day	Dial Setting	8
	Night	Dial Setting	56
T-4516	Day	Dial Setting	8
	Night	Dial Setting	56
T-4600	Htg.	Dial Setting	$\frac{7}{49}$
	Clg.	Dial Setting	$\frac{8}{56}$
T-4756	Htg.	Dial Setting	8
	Clg.	Dial Setting	56

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.

\* This bulletin provides adequate instructions for making basic adjustments to T-4000 series room thermostats. For more detailed information, contact the local branch office.



**A: T-4002 (High Volume Output)**



**B: T-4100 (Low Volume Output)**

**Fig. 1: Single Temperature Room Thermostats**

1. Increase or up to decrease the sensitivity.
2. Set the master pressure to 4 psig (28 kPa).
3. Turn the set point dial to 80F and turn the calibration screw to obtain a 3 psig (21 kPa) output pressure.
4. Set the master pressure to 14 psig (98 kPa).
5. Turn the set point dial until the output pressure returns to 3 psig.
6. The change in dial setting divided by the 10 psig (70 kPa) change in master setting (14 psig - 4 psig = 10 psig) is the actual range of readjustment. If this is not the desired range, move the range of readjustment slider (sensitivity slider in Fig. 1a) toward the control port to decrease or away from the control port to increase the range of readjustment. Readjust the slider screw to the pressure noted in step 1 above. Repeat steps 2 through 6 until the desired range is obtained.
5. Check the output pressure. If it is different from the value found in step 3, turn the sensitivity slider adjusting screw until the output pressure equals that value. For low volume output (plastic body) instruments, use the output adjusting screw to adjust the output pressure.
6. Check the sensitivity. Change the control setting on the dial by at least 5F° and note the new output pressure. The change in output pressure divided by the change in dial setting is the actual sensitivity.
7. Repeat steps 4 through 6 until the desired sensitivity is obtained.

**T-4003 Range of Remote Readjustment**

The range of remote readjustment is adjustable from .15 to 2.5 F°/PSI (.012 to .2C°/kPa) and is factory set at 0.5 F°/PSI (.04 C°/kPa). To determine if the range of remote readjustment needs to be adjusted, proceed as follows:

1. Insert the test gage into the test port fitting and note the output pressure.

**Set Point Adjustment**

Before calibrating the instrument, check to see if the output pressure is already at an appropriate value according to the ambient temperature. For

example, if the actual room temperature is below the set point and the output signal is calling for more heat, the thermostat is doing its job and does not require adjustment.

**T-4002 and T-4100 (See Fig. 1)**

1. Insert the test gage.
2. Furnish supply air to the instrument (restricted supply for T-4100).
3. Note the ambient temperature in the space.
4. Turn the set point dial to that temperature.
5. Turn the calibration screw until the output pressure is at the mid spring range of the controlled device.
6. Turn the set point dial to the desired set point.

**T-4003 Set Point Adjustment**

Insert the gage and set the master pressure to one half of the supply pressure. Follow steps 3 through 6 under T-4002 Set Point Adjustment.

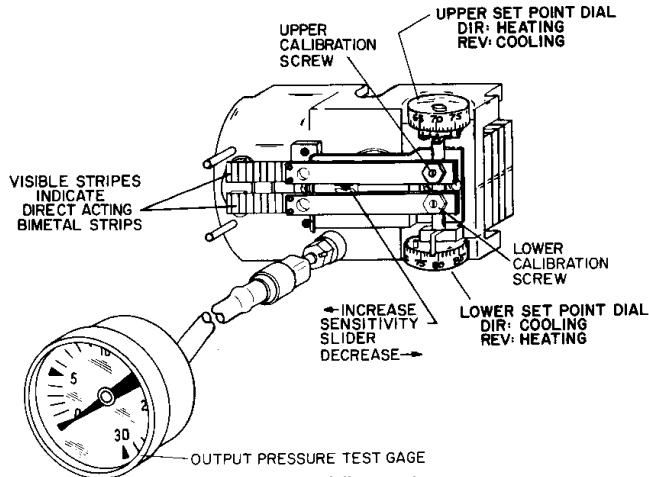


Fig. 2: T-4054 Adjustments

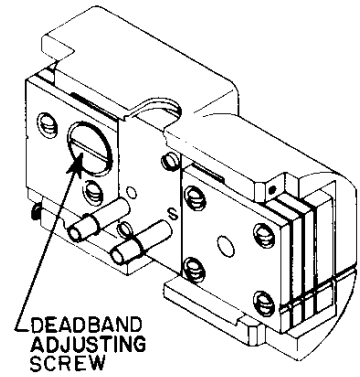


Fig. 3: Back View of T-4054

### T-4054 Deadband and Set Point Adjustment (See Fig. 2)

The T-4054 can easily be adjusted to suit the application by changing the settings on the heating and cooling dials. If the thermostat has been tampered with or is out of adjustment, proceed with the following instructions to recalibrate the instrument.

**Note:** On deadband applications which have overlapping spring ranges, it is suggested that a C-9200 or other sequencing device be used to bias the cooling valve spring range to compensate for spring range shift.

#### Deadband Setting

If it is necessary to check or reset the deadband setting, proceed as follows:

Turn the lower set point dial to 85F on direct acting models or 55F on reverse acting models. Turn the upper set point dial to 55F on direct acting models or 85F on reverse acting models. Insert a hypodermic needle test probe into the test gage. The reading on the test gage is the actual deadband pressure.

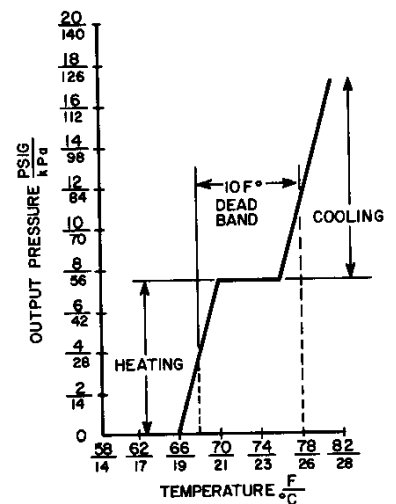
If it is necessary to adjust this pressure to meet application requirements, proceed as follows:

1. Remove the T-4054 from the mounting bracket and pull it away from the wall so the deadband adjusting screw on the back of the instrument is exposed (see Fig. 3).
2. Turn the screw clockwise to increase or counter-clockwise to decrease the deadband pressure until the gage reads the desired pressure. Approximately one half turn will produce a 1 PSI (7 kPa) change in deadband pressure.
3. Return the set point dials to the original settings.

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

1. Set the lower set point dial to 85F for direct or 55F for reverse acting models.
2. Note the ambient temperature at the element.
3. Set the upper dial to this temperature (direct acting model: heating, reverse acting model: cooling).

4. Turn the upper calibration screw until the control pressure is in the middle of the spring range of the controlled device (heating).
5. Set the lower dial to the temperature noted in step 2 (direct acting model: cooling, reverse model: heating).
6. Turn the lower calibration screw until the control pressure is in the middle of the spring range of the controlled device (cooling).
7. Turn the upper dial to the desired set point.



T-4054 Operational Graph

8. Turn the lower dial to the desired set point.
9. The difference in the dial settings is now the deadband. Remove the test gage.

### T-4110 Set Point Adjustment (See Fig. 4)

1. Tee the test gage into the output line.
2. Furnish restricted supply air to the instrument.
3. Note the ambient temperature in the space.
4. Move the set point lever to that temperature.
5. Turn the calibration screw until the output pressure is at the mid spring range of the controlled device.
6. Move the set point lever to the desired set point.

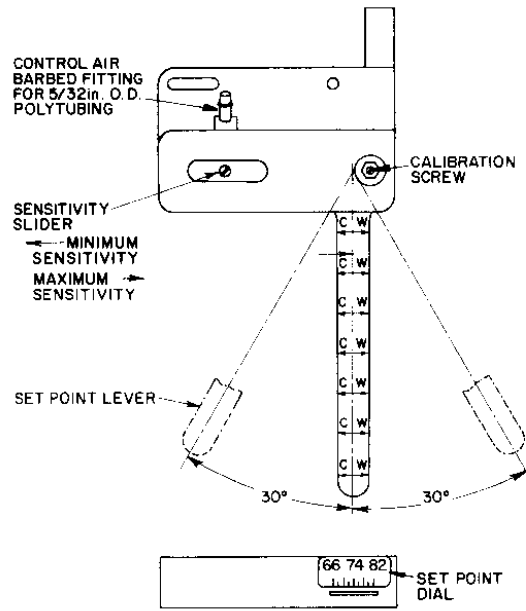


Fig. 4: T-4110 Adjustments

### T-4506 and T-4516 Set Point Adjustment

Usually the day set point is made on the lower element with a 15 psig (105 kPa) supply pressure and the night set point is made on the upper element with a 20 psig (140 kPa) supply pressure. If your application is different, use the proper element and supply pressure for the particular application. The T-4506 is furnished with DAY and NIGHT labels which can be applied to the appropriate element.

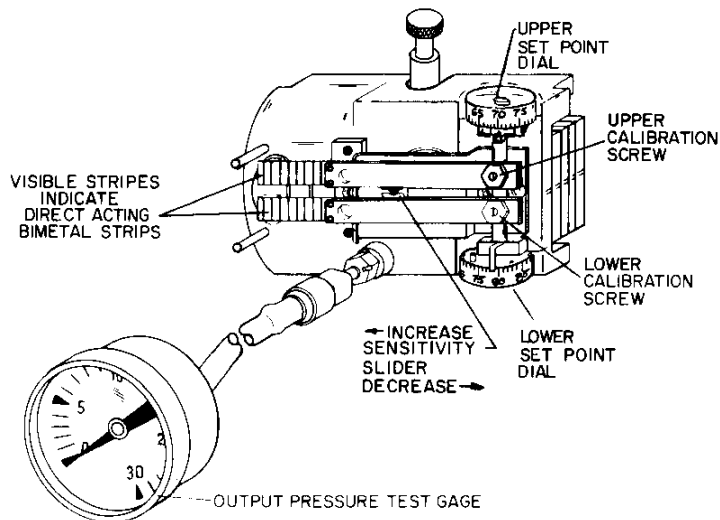


Fig. 5: T-4506 and T-4516 Adjustments

#### Day Set Point Adjustment (See Fig. 5)

1. Insert the test gage.
2. Furnish 15 psig supply pressure for day control (lower dial).
3. Note the ambient temperature in the space.
4. Turn the lower set point dial to that temperature.
5. Turn the lower calibration screw until the output pressure is at the mid spring range of the controlled device.

6. Turn the lower set point dial to the desired day set point.

#### Night Set Point Adjustment

1. Furnish 20 psig supply pressure for night control (upper dial).
2. Note the ambient temperature in the space.
3. Turn the upper set point dial to that temperature.

4. Turn the upper calibration screw until the output pressure is at the mid spring range of the controlled device.
5. Turn the upper set point dial to the desired night set point.
6. Restore the supply pressure to the desired cycle.

## T-4600 Set Point Adjustment

The T-4600 is furnished with HEATING and COOLING labels. Apply each label to the appropriate element to avoid error in calibration or hook up.

### Heating Set Point Adjustment (See Fig. 6)

1. Insert the test gage.
2. Furnish restricted supply air to the instrument.
3. Note the ambient temperature in the space.
4. Turn the heating set point dial to that temperature (match it with the arrow).

pressure to the heating apparatus is at the mid spring range of the controlled device.

6. Turn the heating set point dial to the desired set point.

### Cooling Set Point Adjustment

Repeat the procedure for heating adjustment on the other element. Remember to use the other test port and the proper value in step 5 for the mid spring range of the controlled device.

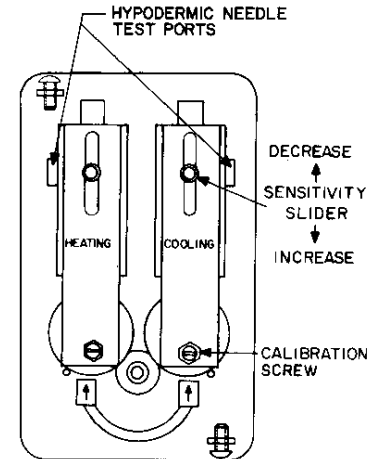


Fig. 6: T-4600 Adjustments

## T-4756 Set Point Adjustment

Usually the heating set point is made on the lower element with a 15 psig (105 kPa) supply pressure and the cooling set point is made on the upper element with a 20 psig (140 kPa) supply pressure. If your application is different, use the proper element and supply pressure for the particular application. The T-4756 is furnished with HEATING and COOLING labels which can be applied to the appropriate element.

### Heating Set Point Adjustment (See Fig. 7)

1. Insert the test gage.
2. Furnish 15 psig supply pressure for heating control (lower dial).
3. Note the ambient temperature in the space.
4. Turn the lower set point dial to that temperature.
5. Turn the lower calibration screw on the heating element until the output pressure is at the mid spring range of the controlled device.
6. Turn the lower set point dial to the desired heating set point.
5. Turn the calibration screw on that element until the output

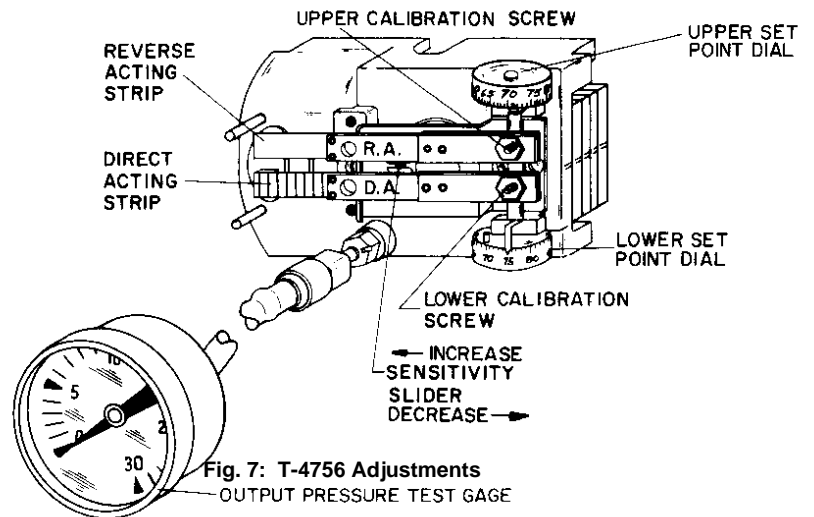


Fig. 7: T-4756 Adjustments

### Cooling Set Point Adjustment

1. Insert the test gage.
2. Furnish 20 psig supply pressure for cooling control (upper dial).
3. Note the ambient temperature in the space.
4. Turn the upper set point dial to that temperature.
5. Turn the upper calibration screw on the cooling element until the pressure is at the mid spring range of the controlled spring range of the controlled device.
6. Turn the upper set point dial to the desired temperature.
7. Restore the supply pressure for the desired cycle.

## Switchover Point Adjustment for T-4506, T-4516, and T-4756

The above thermostats are factory set to switch from one element to the other at 17 psig for a typical 15-20 psig supply system. If a different supply system is to be used, proceed with the following instructions to reset the switchover point to a value between the two supply pressures. The switch point is adjustable from 15 to 20 psig (105 to 140 kPa).

1. Remove the controller from the mounting bracket.
2. Connect a variable pressure source to the supply connection and attach a gage to the output connection.
3. Set the supply pressure to 15 psig and rotate the lower dial to produce approximately 5 psig (35 kPa) on the output gage.

4. Increase the supply pressure to 20 psig and rotate the upper dial to produce approximately 15 psig on the output gage.
5. Set the supply pressure to the desired switchover point.
6. Slowly turn the switchover adjusting screw (see Fig. 8) clockwise to increase or counterclockwise to decrease the switch point until the output changes.  
**Note: Do not turn the switchover adjusting screw more than 3-1/2 complete revolutions in either direction.**
7. Recheck the switchover point by increasing and decreasing the supply pressure over the switch point to see that switchover occurs at the desired value.
8. Remove the gage and tubing and replace the instrument on the mounting bracket.

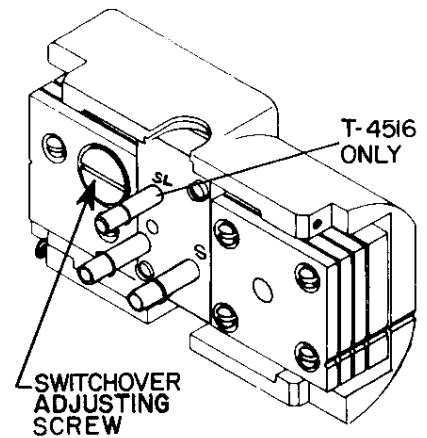


Fig. 8: Back View of Instrument

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## Notes

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