

## 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.

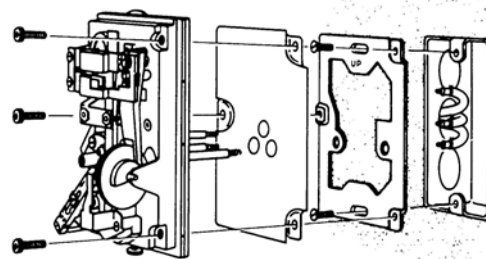
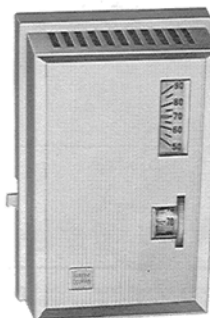


Figure-1 Mounting Thermostat to Electrical Box.

## 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)	15 psig (103.4 kPa)- Day 20 psig (137.9 kPa)- Night		
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).

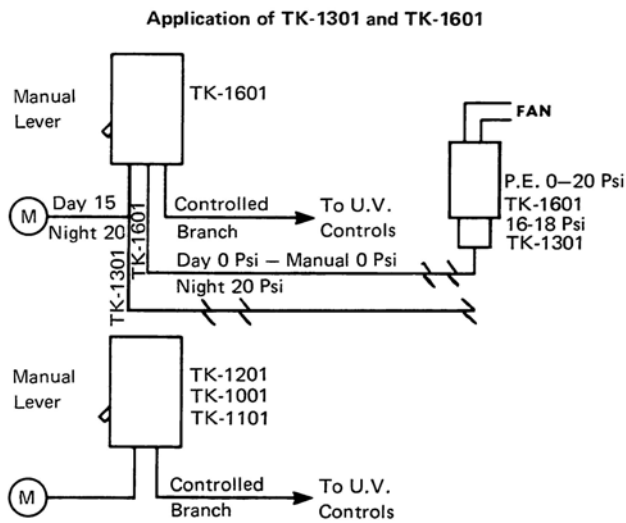


Figure-2

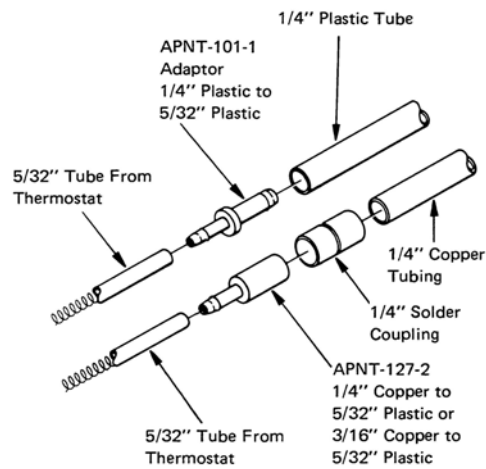


Figure-3

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.

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*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.

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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.

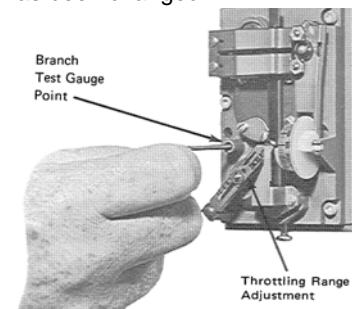


Figure-4

**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.

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**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.

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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).

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

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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.

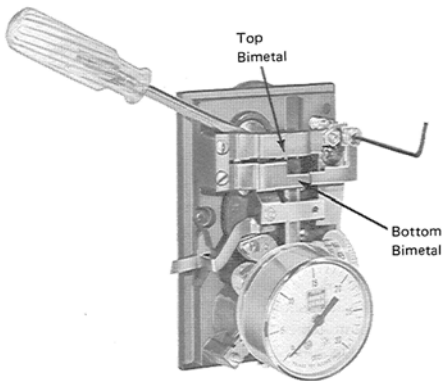


Figure-5

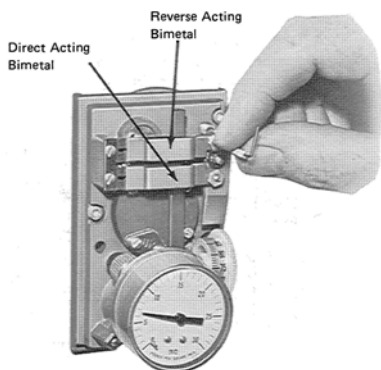


Figure-6

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  $8 \text{ psi} \pm 1 \text{ psi}$  ( $55.1 \text{ kPa} \pm 7 \text{ kPa}$ ).
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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