For proportional temperature control of pneumatic valves and actuators to maintain discharge temperature of reheat systems and sampling chamber or return air temperature of terminal units and as a proportional low limit thermostat.

GENERAL INFORMATION

Proportional control type of pneumatic instrument, using balanced lever system actuated by a liquid-filled thermal copper element with a 3' (914 mm) capillary.

Maximum Safe Air Pressure: 30 psig (207 kPa).

Maximum Safe Case Temperature: 140°F (60°C).

Mounting: Directly by means of top mounting holes or with a right angle mounting bracket included with thermostat.

Air Connections: Post with barb for 1/4" O.D. plastic tubing.

Air Consumption for Sizing Air Compressor: .016 scfm (8 ml/s) @ 15 psig (103 kPa), .024 scfm (11 ml/s) @ 20 psig (138 kPa).

Air Capacity for Sizing Air Mains: 36 scim (10 ml/s) @ 15 psig (103 kPa), 50 scim (14 ml/s) @ 20 psig (138 kPa).

Dimensions: 4-5/8" (117 mm) high x 2-1/8" (54 mm) wide x 1-5/8" (41 mm) deep.

Options

None

ACCESSORIES

AT-208 Duct mounting kit
Tool-95 Pneumatic calibration tool kit
Table 1: Model Chart

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description and Action(^a)</th>
<th>Max. Safe Bulb Temp. °F (°C)</th>
<th>Bulb Style Dimensions in inches (mm)</th>
<th>Control Dial Range °F (°C)</th>
<th>Throttling Range</th>
<th>Supply Air Pressure psig (kPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TK-2001</td>
<td>Heating DA(^b)</td>
<td>140 (60)</td>
<td>Straight 7/32 x 14 (6 x 356)</td>
<td>Dial Marked Cooler-Warmer 60-90 (15-32)</td>
<td>Adjustable 2-10°F (1-6°C)/10 psi (69 kPa)</td>
<td>15 (103)</td>
</tr>
<tr>
<td>TK-3001</td>
<td></td>
<td></td>
<td>Coiled 1 x 5 (25 x 127)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TK-4001</td>
<td></td>
<td></td>
<td>Averaging 1/8 x 48 (3 x 1.2 m)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TK-2201</td>
<td>Heating-Cooling 20 (138) DA 15 (103) RA</td>
<td></td>
<td>Straight 7/32 x 14 (6 x 356)</td>
<td></td>
<td>Adjustable 5-25°F (3-14°C)/10 psi (69 kPa)</td>
<td>15 (103) RA(^a) Cooling 20 (138) DA(^a) Heating</td>
</tr>
<tr>
<td>TK-3201</td>
<td></td>
<td></td>
<td>Coiled 1 x 5 (25 x 127)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TK-2012</td>
<td>Heating DA(^b)</td>
<td>230 (110)</td>
<td>Straight 3/16 x 11-1/4 (5 x 266)</td>
<td>Dial Marked Cooler-Warmer 30-90 (-1 to 32)</td>
<td>Adjustable 5-25°F (3-14°C)/10 psi (69 kPa)</td>
<td>15 (103) RA(^a) Cooling 20 (138) DA(^a) Heating</td>
</tr>
<tr>
<td>TK-4012</td>
<td></td>
<td></td>
<td>Averaging 3/32 x 54 (2 x 1.4 m)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TK-4212</td>
<td>Heating-Cooling 20 (138) DA 15 (103) RA</td>
<td></td>
<td>Averaging 3/32 x 54 (2 x 1.4 m)</td>
<td></td>
<td>Adjustable 5-25°F (3-14°C)/10 psi (69 kPa)</td>
<td>15 (103) RA(^a) Cooling 20 (138) DA(^a) Heating</td>
</tr>
<tr>
<td>TK-4212-201</td>
<td>Heating-Cooling Low Limit(^c) 20 (138) DA Full Output 15 (103)</td>
<td></td>
<td>Averaging 3/32 x 54 (2 x 1.4 m)</td>
<td></td>
<td>Adjustable 5-25°F (3-14°C)/10 psi (69 kPa)</td>
<td>15 (103) Full Output 20 (138) DA(^a) Heating</td>
</tr>
</tbody>
</table>

\(^a\) Direct Acting (DA) - Increase output pressure on temp. rise.
Reverse Acting (RA) - Decrease output pressure on temp. rise.
\(^b\) Field changeable to reverse acting.
\(^c\) AT 20 psi (138 kPa) unit can bleed down a branch line from a controlling thermostat.
At 15 psi (103 kPa) unit is inoperative, i.e. passes controlling thermostat signal.

DIMENSIONS

Figure 1: Mounting Dimensions.
INSTALLATION

Locating

The thermostat can be mounted in any position. However, it is most common to mount the thermostat with the setpoint adjusting shaft on top. The adjusting mechanism is in the thermostat on the side opposite from the setpoint knob shaft. This area should be readily accessible so that the thermostat can be serviced easily. Locate the bulb in the return air intake in a position where it will sense representative air temperatures.

Mounting

If the thermostat is mounted directly to the unit air conditioner, drill three holes corresponding to the location of the mounting holes and setpoint shaft in the thermostat. To use bracket, drill three holes to match any three of the five bracket mounting holes selected (Figure 1).

Mount the thermostat using the two #10-32 screws, and the scale plate which indicates the temperature setting. Attach the knob, positioned so that the pointer indicates the cooler (CCW) position on the scale. Rotate setpoint to midscale.

Uncoil the capillary tubing and fasten the bulb in the air stream being controlled as shown in Figures 2 and 3 below. (See Figures 7 and 8 for duct mounting template and assembly). Attach 1/4" O.D. plastic tube to “m” (main) and “B” (branch) fittings by slightly rotating the tubes back and forth and pushing firmly onto the fitting (see Figure 4).

CONVERSION OF DIRECT ACTING THERMOSTAT TO REVERSE ACTING

1. Remove direct acting calibration screw complete with tension nut (Figure 4).
2. Insert screw into threaded hole where reverse acting screw is shown in Figure 4.
3. Tighten tension nut carefully until it is snug.

Caution: DO NOT overtighten as this will ruin nut.

4. Calibrate per instructions shown below.

THROTTLING RANGE ADJUSTMENT

The throttling range 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 control system.

The throttling range is changed by sliding the throttling range adjustment pivot in the flapper to its proper position (see Figure 4). Calibration of the thermostat should be checked after the throttling range has been changed. When making the throttling range adjustment, care should be taken to prevent excessive side forces on the flapper lever (see Figure 6).

Caution: In no case should the pivot point be raised when the adjustment is made (see Figure 6).

CALIBRATION

After the throttling range adjustment is made, the thermostat should be checked for calibration. As a nominal calibration, the controlled branch pressure should be 8 psig (55 kPa) when the setpoint is equal to the bulb temperature, indicated by a thermometer located near the bulb. In some applications, a value other than 8 psig (55 kPa) will be required to get the desired control results. Change the 8 psig (55 kPa) designation as used in the calibration procedure, should this be the case.
Calibrate the thermostat as follows (See Figure 5):
Disconnect the branch line at the thermostat and attach a test
gauge to the fitting (B). Push the tubing on as far as it will go,
approximately 1/4” (6 mm). The tubing for this test gauge
should be approximately 6” (150 mm) long to permit bringing
the gauge out from the test point to a place where it can be
easily read. The supply pressure to the thermostat should be
15 psig (103 kPa).

One Temperature Thermostats
These thermostats are factory adjusted to operate at the
midpoint of the dial span, when the adjusting dial is in its
mid-position. Whenever the throttling range is changed, the
thermostat calibration should be checked and adjusted if
necessary as follows:

1. The scale on the thermostat represents 30°F (17°C) or
60°F (33°C) span (see page 1) with the desired control
point in the center. Each division is equal to 5°F (3°C) for
30°F (17°C) span units and 10°F (6°C) for 60°F (33°C)
span units.

2. Observe the temperature of the bulb using a test
thermometer. Turn the knob of the thermostat to the point
on the scale which would correspond to the bulb
temperature. Read the branch line pressure. It should be
8 psig ±1 psig (55 kPa ±7 kPa).

3. If the pressure is not 8 psig (55 kPa) use a .048” Bristol
wrench (TOOL-82) in the calibrating screw and adjust the
screw to obtain 8 psig (55 kPa). The proper screw holes
for the reverse acting or direct acting calibration are
labeled on the main lever (Figure 5).

Caution: Caution should be taken when adjusting the reverse
acting setpoint screw. Avoid unnecessary side motions and
particularly avoid lifting the lever to which the screw is
attached. Burrs on the Bristol wrench could cause it to stick in
the screw. Note also, that the hex nuts on the adjusting
screws are used to provide tension only and should not be
loosened when making calibration adjustments.

4. When the calibration has been completed, turn the knob
to the desired setpoint and remove the gauge, reconnect
the branch line and replace the cover.

Heating-Cooling Thermostats
1. Adjust the supply line pressure for the system to 25 psig
(172 kPa).
2. Connect a pressure regulator into the supply main
between the main and the thermostat at the thermostat
location.
3. Adjust the regulator to 20 psig (138 kPa); at this supply
pressure the thermostat is direct acting.
4. Set the dial knob on the thermostat to the bulb
temperature setting and observe the branch line control
air pressure. This pressure should be 8 psig ±1 psi (55
kPa ±7 kPa).
5. If not, adjust the direct acting screw to obtain 8 psig (55
kPa) branch line control pressure using a .048” Bristol
wrench (Tool-82).

Caution: Do not loosen the hex nut on the screw. This nut is
for friction purposes only; it does not lock the screw.

6. Adjust the regulator in the main line to 15 psig (103 kPa).
At this supply pressure the temperature is reverse acting.
7. Observe the branch line control air pressure. If this
pressure is not 8 psig (55 kPa), use a .048” Bristol wrench
(TOOL-82) and adjust the reverse acting calibrating
screw to obtain an 8 psig (55 kPa) branch line control
pressure.

Caution: The lever to which this screw is attached contains
a spring hinge and is pivoted on the switch point adjusting
spring. Undue side motion or forces tending to lift the switch
lever off the main lever can damage the hinge or unseal the
lever.

8. Recheck calibration by switching the supply pressure
between 15 and 20 psig (103 and 138 kPa) several times
and observe the control pressure. If it varies from the
desired pressure, repeat the calibration procedures.

9. Calibration is now complete. Turn the adjusting knob to
the desired setpoint. Remove the test gauge and
regulator, reconnect the main and branch lines and
replace the cover.

Heating-Cooling Low Limit TK-4212-201
A special Heating-Cooling Thermostat is available for unitary
heating-cooling applications. This thermostat is very similar to
the TK-4212 except:

1. The restriction plate has been removed making the unit a
one pipe thermostat. The air signal to the main connection
actuates only the switchover parts.

2. The R.A. calibration screw has been removed. Therefore,
when the main pressure is reduced to 15 psig (103 kPa).
there is no calibration screw to contact the main lever and
the flapper closes the nozzle completely and the
thermostat is inoperative.

To calibrate apply 20 psig (138 kPa) to the main and full
branch pressure from the primary controller to the branch
connection of the TK-4212-201. Then calibrate as a single
temperature D.A. thermostat.
MAINTENANCE

This is a quality product. Regular maintenance of the total system is recommended to assure sustained optimum performance.

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Description</th>
<th>Quantity in Kit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Filter</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Restrictor Gasket</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Restrictor</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Restrictor Gasket</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Air Connector</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Screws</td>
<td>2</td>
</tr>
</tbody>
</table>

FIELD REPAIR

Repair is not recommended except for replacement of restrictor assembly. Use AT-529 restrictor kit (see Figure 6) if restrictor replacement is required. Otherwise, replace thermostats if system is not operating correctly and the cause is traced to the thermostat.

Figure-6 AT-529 Restrictor Kit

Figure-7 AT-208 Duct Mounting Kit.

Figure-8 Bulb Mounting Hole Arrangement for Drilling Ductwork.