

INSTALLATION, OPERATION,
AND MAINTENANCE INSTRUCTIONS

PNEUMATIC TEMPERATURE CONTROLLER

PART NO. 18557-1 AND 18557-2

AERCO INSTRUCTION NO. AC-103
PNEUMATIC TEMPERATURE CONTROLLER

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AERCO INSTRUCTION NO. AC-103

PNEUMATIC TEMPERATURE CONTROLLER

1.0 DESCRIPTION

The AERCO Pneumatic Temperature Controller, (see figure 1), is a proportional control instrument. It is a reverse acting controller whose output air pressure decreases proportionally with a rise in temperature and vice versa.

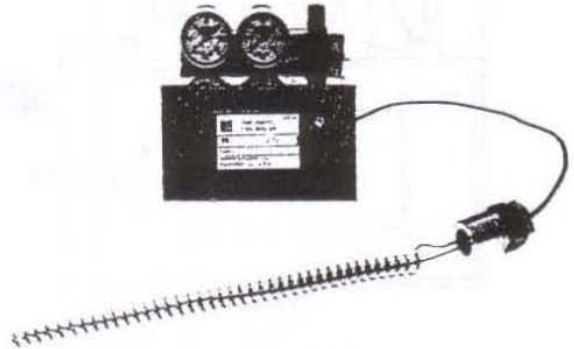
It utilizes a remote averaging type liquid filled thermal sensing element bulb specifically designed for use with Aerco Heat Exchangers

The thermal element actuates a piloted non-bleed relay through a stable balanced lever system. Internal feedback provides accurate proportional control at all levels of sensitivity. The unique design provides compensation to counteract the effects of variations in ambient temperature.

2.0 SPECIFICATIONS

- **Temperature Range:** -20 °F to +240°F
- **Maximum Safe Bulb Temperature:** 310°F
- **Maximum Safe Controller Case Temperature:** 150°F ambient
- **Supply Air Pressure:** 20 PSIG minimum, 30 PSIG maximum
- **Air Consumption:** 0.008 standard cubic feet per minute (SCFM) average

- **Air Capacity:** Maximum air requirement for sizing air mains is 16 SCFM.



3.0 INSTALLATION

Dimensions for the Controller are shown in Figure 2.

The Controller can be mounted on the Aerco Heater either by mounting it inside a Heater control box or by using the mounting bracket, P/N 16617, shown in Figure 2. When mounting the controller, it must be mounted in an upright vertical position.

3.1 CONTROLLER PART NO. 18557-1 must be used when the AERCO Heat Exchanger includes an Anticipator Temperature Control System. A thermal well bushing, P/N 5143, is used with the Controller thermal element, (see Figure 3). When the bushing is furnished, insert the bushing and thermal element bulb into the connection marked "Thermostat" on the top head of the Heat Exchanger (See the

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TEMPERATURE CONTROLLER

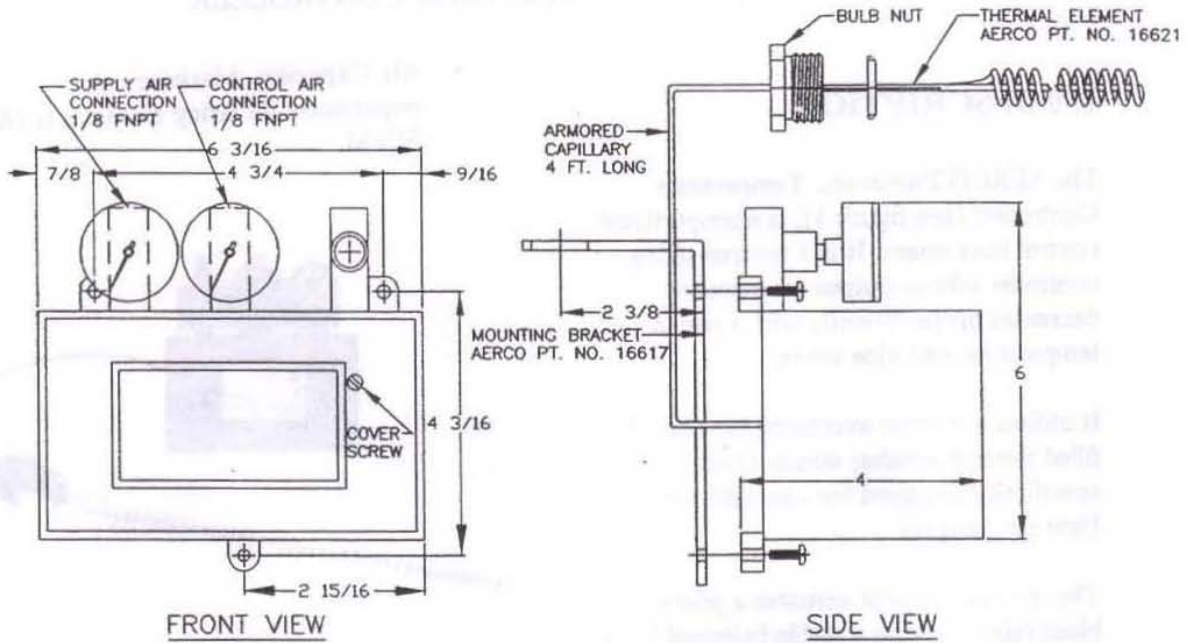


FIG 2

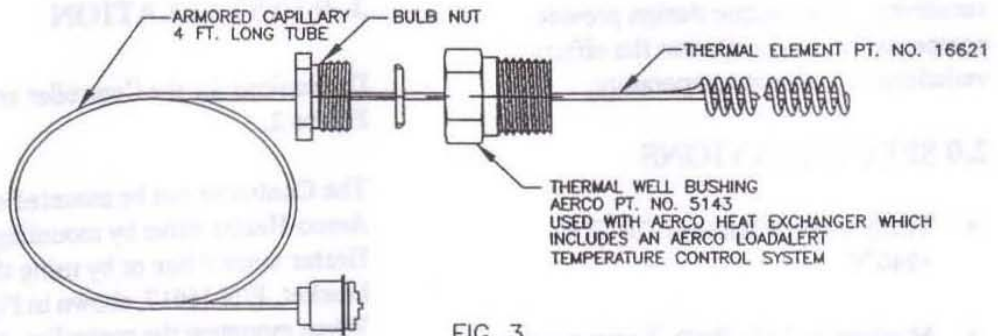


FIG 3

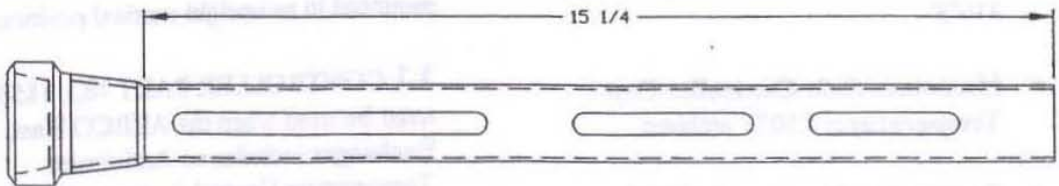


Figure 4 – THERMAL ELEMENT SUPPORT, AERCO PT. NO. 16558. Used with AERCO Heat Exchanger which does not include an AERCO Loadalert Temperature Control System.

Heat Exchanger instructions or drawing). Make sure that the bulb nut and bushing are water tight.

3.2 CONTROLLER PART NO. 18557-2 must be used when the AERCO Heat Exchanger does not include an Anticipator System. A thermal element support, P/N 16558, is included and used with the thermal element inside the heater, (see Figure 4). This is typically utilized on units having side flange connections. When the support is furnished, insert it into the connection marked "Thermostat" on the top head of the Heat Exchanger (see the Heat Exchanger instructions or drawing). Then insert the thermal element bulb into the support. Make sure that both the bulb nut and support are water tight.

CAUTION: Note that the thermal element support is slotted and has an open end. NEVER use the Controller thermal element bulb in a closed well—this will severely limit the sensitivity of the element to changes in temperature.

CAUTION: When installing the thermal element, do not twist or allow any sharp bend in its capillary tubing.

To remove the thermal element on either style described above, unscrew the bulb nut and pull the bulb straight up and out.

4. 0 START-UP OPERATION

4.1 Provide clean, dry, oil free supply air to the Controller at 20 PSIG min., to 30 PSIG max.

4.2 Put the AERCO Heat Exchanger into operation in accordance with instructions furnished with the Heat Exchanger.

4.3 It is mandatory to maintain a constant and not fluctuating flow rate through the heater for temperature calibration. A constant flow rate of between 25% to 30% of unit's rated maximum flow rate is recommended.

4.4 Adjust the Controller's setpoint dial to the desired outlet temperature setting. Turn the set point dial by hand only. Do not use the dial's center screw. Observe the outlet temperature either on the heater's dial thermometer or on a thermometer installed in the outlet piping.

4.5 If the Controller and control system maintain a stable setpoint temperature, and there are no signs of cycling or "hunting", no further adjustments are required. If "hunting" or cycling is observed, refer to the Troubleshooting section of this O&M.

Note: Adjustments to the controller's setpoint calibration screw must be made in small increments and time must be allowed for the temperature regulator valve to settle. (A small amount of hissing will be heard when making an adjustment. This hissing is a change in air flow through the Controller due to the adjustment. Once this hissing is heard, no further adjustment should be made until the system has had ample time to settle).

4.6 If the outlet temperature is higher than the desired setpoint, adjustments should be made to the Controller's setpoint calibration screw, (see detail "A" in Figure 5). Using a spline key wrench, P/N122887, (see Figure 7), make small counterclockwise adjustments.

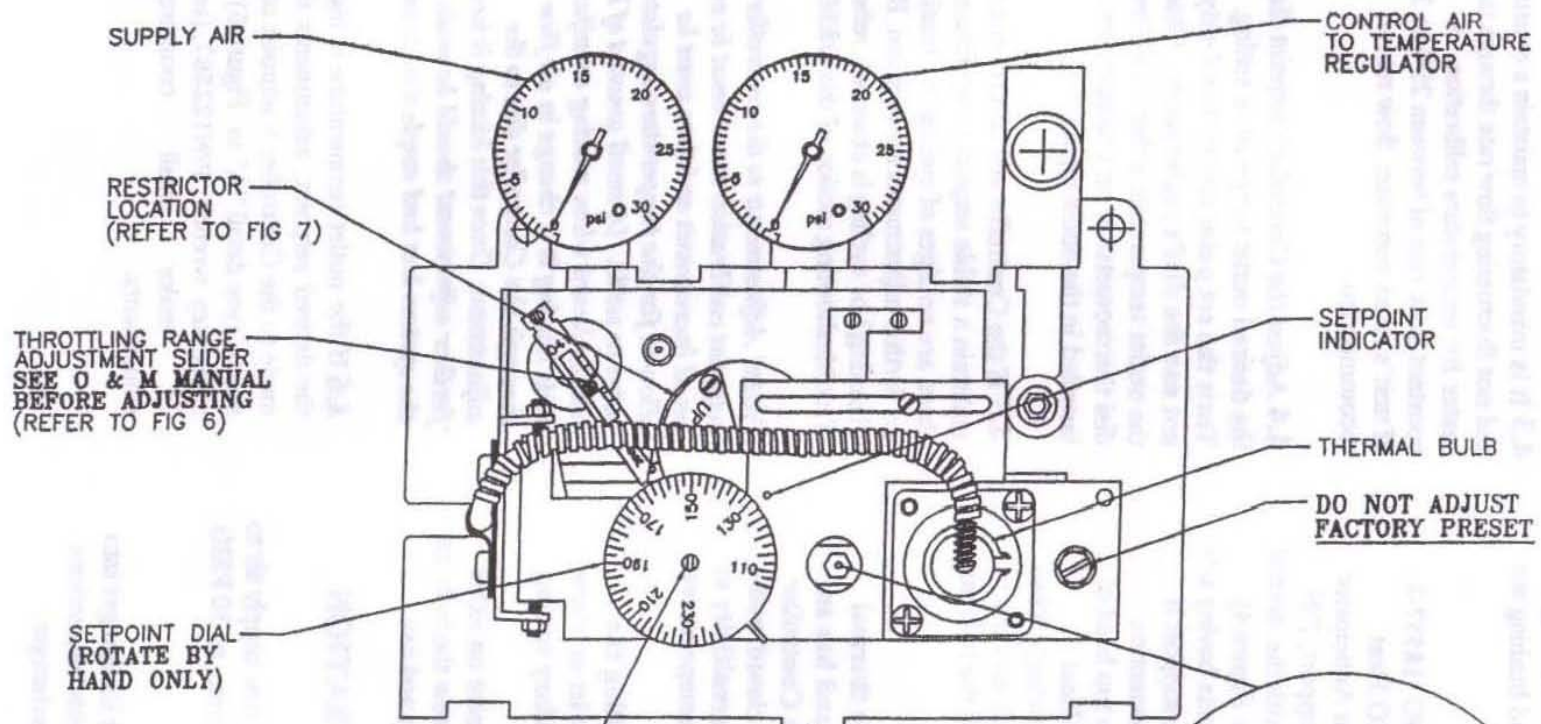
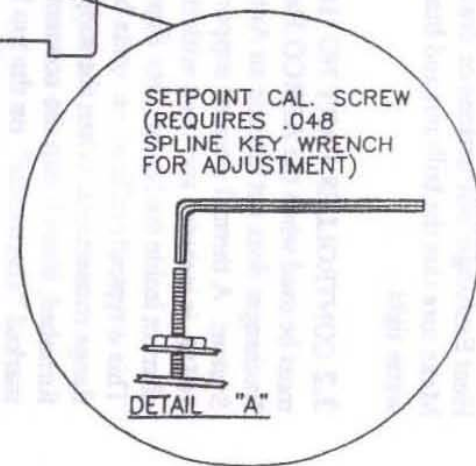


FIG 5



4.7 If the outlet temperature is lower than the desired setpoint, small adjustments should be made to the Controller's setpoint calibration screw in a clockwise direction using a spline key wrench.

4.8 If, after a reasonable amount calibration and ample time for the system to settle, the outlet water temperature is 10 degrees higher or lower than the setpoint, or the outlet water temperature fluctuates widely:

- Do not attempt any further adjustment of the setpoint calibration screw.
- Do not attempt to adjust any of the screws, slides, nuts, or bolts on the Controller. This can take the Controller out of calibration. Once a Controller is out of calibration, it must be returned to the factory and a charge will be incurred for recalibration.
- Temperature control problems can be related to a malfunctioning heater, the temperature regulating valve, or various system related problems.
- See the Troubleshooting section of this O&M.

5.0 CHECKING THE CONTROLLER FOR PROPER OPERATION

5.1 The following procedure is used to determine if the Pneumatic Temperature Controller is operating properly.

5.1.1 With the setpoint dial at the outlet water temperature, the control air pressure should be at 5 PSIG.

5.1.2 Rotate the setpoint dial 5-10° below the outlet water temperature. The control air signal should be 0 PSIG

5.1.3 Rotate the setpoint dial 10° above the outlet water temperature. The control air signal should be at 13 PSIG or higher.

If the Controller responds as described in 5.1.1, 5.1.2, or 5.1.3 above, the Controller is operating properly. If it does not, it may be out of calibration or should be replaced.

5.2 The Controller setpoint MUST be recalibrated if:

5.2.1 The thermal element has been replaced (see Start-Up Operation).

5.2.2 The dial setpoint, when at 5PSI, did not agree with the actual outlet temperature (see Start-Up Operation).

6.0 TROUBLESHOOTING

6.1 Water going over temperature, i.e., Heater temperature limit system is dumping water from its water relief solenoid in the Heater head and the red light on the control panel is illuminated. Check the following:

6.1.1 Ensure that the temperature limit control (usually a Honeywell switch inside the control box and mounted next to the Controller) is set at least 20° above the desired set point (preferably all the way up during start-up).

6.1.2 The temperature regulating valve may not be closing fully. See the temperature regulator valve O&M manual.

6.1.3 If the control air gauge shows 15 PSIG and the outlet water temperature is 10° or higher than the setpoint, try recalibrating the Controller setpoint as per the Start-Up Operation section of this O&M. If the condition persists, the thermal element may be defective.

***NOTE:** To determine if the thermal element is bad disconnect the bellows section from the controller. Push down on the bellows. If the bellows is hard, does not compress, the element is okay. If the bellows is spongy and has a significant amount of movement when pushed down on it, the element is bad.*

If the controller, or the thermal element, or both are replaced, the system must be recalibrated – see the Start-Up Operation section of this manual.

6.2 Water in the heater remains cold (40° to 70°). Check the following:

6.2.1 Is the correct air pressure being supplied to the Controller, i.e., does the supply air pressure gauge, (Figure 5), read between 20 and 30 PSIG? If not, correct the air supply and make the necessary correction to provide 20 PSIG min. and 30 PSIG max. supply air.

6.2.2 Is the Controller sending a full signal (approximately 15 PSIG) to the temperature regulator valve. If there is a full 15 PSIG signal to the valve and the temperature regulating valve does not open see the temperature regulating valve O&M manual.

6.2.3 Is the Controller sending 0 PSIG or only a small air pressure on the control air pressure gauge on the right? Disconnect the air tubing from the gauge (as close to the gauge as possible – the connection to the air solenoid may be easiest) and cover with a fingertip. If the control air gauge signal jumps to 15 PSIG, there is either an air leak between the Controller and the temperature regulator or the temperature regulator has a hole in its diaphragm. Refer to the Temperature regulator O&M manual.

6.2.4 If the temperature regulator control air gauge signal does not jump to 15 PSIG when the air tubing to the valve is covered with a fingertip, reconnect the tubing and turn the setpoint dial all the way up to 240°. The temperature regulator valve should open and the sound of air hissing from the controller should diminish with a setpoint dial increase.

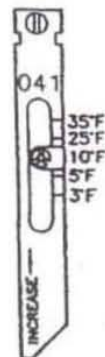
Next turn the setpoint dial down to 100°. The hissing sound of the air bleeding off should be heard. If no hissing sound is heard, the Controller's restrictor ports may be clogged. A new pilot restrictor kit, see the MAINTENANCE section of this manual, may be installed. This may also indicate a dirty or wet air supply. If the restrictor is replaced, the Controller MUST be checked for proper operation, as per the CHECKING THE CONTROLLER FOR PROPER OPERATION section of this manual. If after changing the pilot restrictor the sound of air bleeding off is not heard, it is an indication that there is internal blockage in the Controller. The Controller must be replaced.

6.3 If the outlet water temperature is unstable and fluctuates widely. Check the following:

6.3.1 Ensure that this condition is not a result of a widely fluctuating hot water demand (a quick on high, quick off load pattern) such as that produced by a process or laundry. If so, contact your local Aerco Representative.

6.3.2 Observe the temperature regulator Control Air Gauge. Is the signal "hunting" - rapidly fluctuating up and down resulting in the heater's temperature regulating valve and, also the water temperature to vary? If so refer to the valve O&M, VA-106, section T-13. If this does not solve the problem, the temperature regulating valve may be oversized. Contact your local AERCO representative for verification of valve size.

6.3.3 If the temperature regulating valve is sized, and properly adjusted, then either the sensitivity of the Controller is too high, or the Controller is out of calibration, see the CHECKING THE CONTROLLER FOR PROPER OPERATION section of this manual to determine if the controller is operating properly and therefore in calibration. If the sensitivity is too high, it is because the throttling range is too small for your particular application. The Controllers are calibrated with a 10° throttling range at the factory. This has been found to be sufficient for most potable water applications. Some applications may require a larger throttling range. To adjust the Throttling Range, move the slider up in the direction of "increase". This will decrease the sensitivity, (see figure 6). Make very small slider adjustments and wait several minutes between each adjustment to ensure that the system has had time to stabilize. Recalibrate the Controller setpoint if necessary.



THROTTLING RANGE
ADJUSTMENT SLIDER

FIG 6

6.4 The outlet water temperature thermometer reads a different temperature than the setpoint dial setting.

6.4.1 Ensure that the thermometer reads correctly by comparing with a known working source.

Note: The most accurate temperature indication will be seen downstream of heater in the outlet piping.

7.0 MAINTENANCE

7.1 Maintain a clean and dry air supply. Contamination by wet, dirty air will clog the Controller, necessitating complete replacement.

7.2 The air filter, P/N122679, (see Figure 7), included with your Controller MUST be installed in the supply air line. The air filter should be inspected every 6 months and changed yearly. This filter is not meant to clean and dry air supplies. An instrument quality air supply must be used.

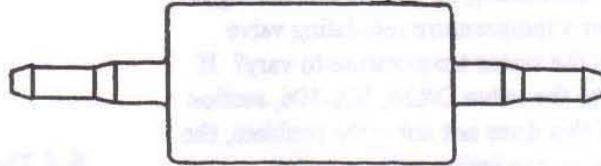
7.3 Change the pilot restrictor kit, P/N122885, yearly, (see Figure 7).



1.



.048 SPLINE KEY WRENCH
PT. NO. 122887



2.

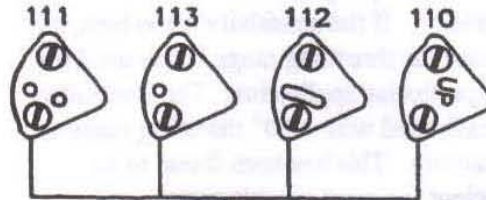
FILTER PT. NO. 122679

ITEM NO.	QUANTITY	DESCRIPTION
111	1	GASKET
113	1	RESTRICTOR: PLATE
112	1	GASKET
110	1	CLAMP PLATE
114	2	SCREW



RESTRICTOR

3.



RESTRICTOR KIT PT. NO. 122885

FIG 7