

CATALOG ETHC 1289-1

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ENVIRO-TEC

**OPERATIONS & BALANCING MANUAL
ELECTRIC HEAT CONTROLLER**



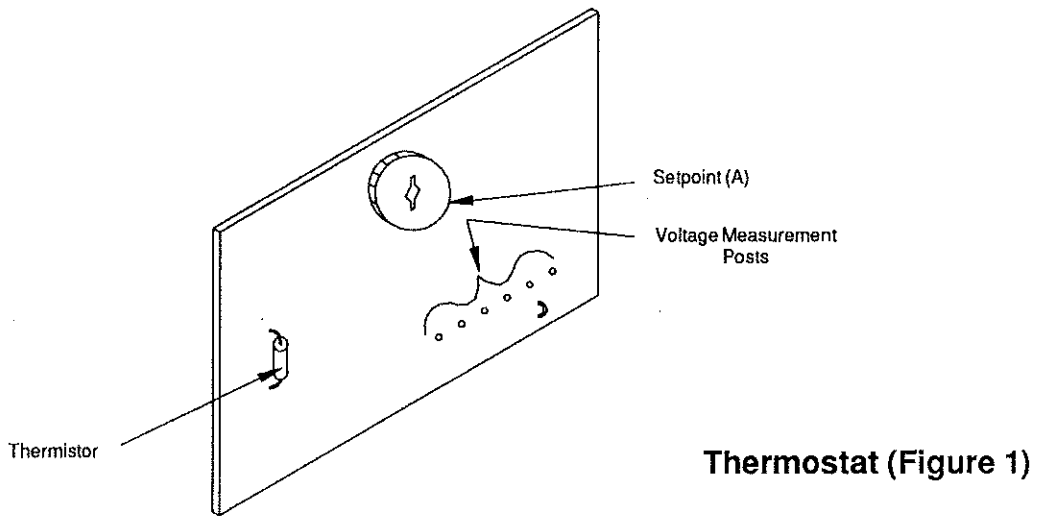
ENVIRONMENTAL TECHNOLOGIES
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The contents of this manual provide all information necessary for proper installation, start-up, air balance, and troubleshooting of HEAT - ONLY Analog Electronic Controls.

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1.0 DEFINITIONS AND DESCRIPTIONS



Thermostat (Figure 1)

Thermostat

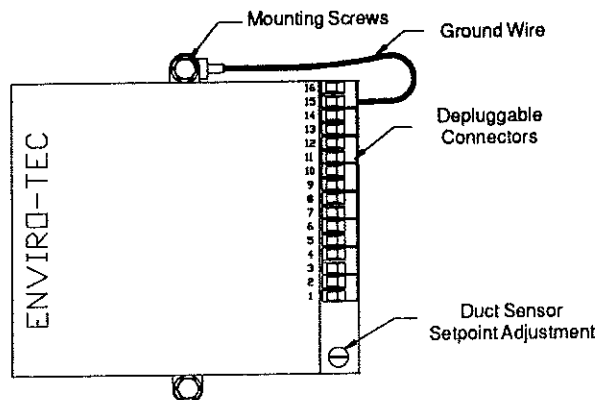
- a. Thermistor - Glass encapsulated, hermetically sealed temperature sensing device mounted on front of the thermostat printed circuit board.

- b. Setpoint Control "A" - Green thumbwheel potentiometer mounted on front of the thermostat printed circuit board. "A" adjusts temperature setpoint for heater operation.
- c. Enclosure - Protects thermostat and provides stable temperature environment for sensing. Vertical fins on cover face must be on left hand side of enclosure directly over thermistor.
- d. Connectors - Captive screw type. Terminal designations are printed on the front of the circuit board.
- e. Thermostat Packaging - Bubble pack design for protection during shipment. Terminal numbers, signal designations, serial number, inventory number and ETI job number are shown on outside of package.

Controller

- a. Enclosure - Black, flame retardant ABS plastic. Mounted to plate on side of heater with two sheet metal screws.
- b. Connectors - Two-piece, depluggable, screw type.
- c. Labels - Computer printed with terminal numbers, signal designations, serial number, inventory number, and ETI Job Number.

**Controller
(Figure 2)**



2.0 INSTALLATION

2.1 Inspection

Upon receipt of heater, check controls for shipping damage such as loose or broken connectors, broken controller housing, and loose wiring. Also inspect both before and after installation for damage caused by abuse or mishandling. A diagram of a typical control component mounting configuration is provided.

2.2 Coordination Of Trades

Contractor should see that all trades involved with both the heater and the electronic controls (including thermostats) have a copy of the documentation prior to installation.

2.3 Thermostat Mounting

The thermostat may be mounted directly to drywall or, optionally, to a horizontally mounted, single gang junction box.

2.3.1 Drywall Mounting (Fig 3 & 4)

- a. Drill holes in wall for cable from controller and 2 wall anchors. Insert wall anchors in wall. Remove printed circuit board from base. If plastic retaining pins are tight, pry up the pins with a small screwdriver. Caution- Take care not to damage components on printed circuit board when prying out plastic retaining pins.
- b. Run cable through L-shaped hole in thermostat base and fasten base to wall with screws provided as shown in sketch.

- c. Mount circuit board on base so Setpoint Dial is at bottom between board and base (exposed set point unit) or at top (standard unit). Use guide pins to align. Fasten circuit board to base using plastic retaining pins provided.
- d. Snap cover onto base making sure vertical slots are on left side (ENVIRO-TEC is right side up).

2.3.2 Single Junction Box Mounting (Figure 5)

- a. Install right-side screw (left-side for exposed set point thermostat) through bracket & fix bracket to junction box.
- b. Install left-side screw (right-side for exposed set point thermostat) through thermostat base plate and bracket, into junction box. Do not tighten fully.
- c. Install center screw through thermostat base plate and bracket.
- d. Tighten all three screws. Mount circuit board on base per 2.3.1c.
- e. Snap cover onto base making sure vertical slots are on left side (ENVIRO-TEC is right side up).

2.4 Wiring Installation

Note: Caution- Disconnect all power supplies to the system before wiring to avoid damage to the equipment or possible electrical shock.

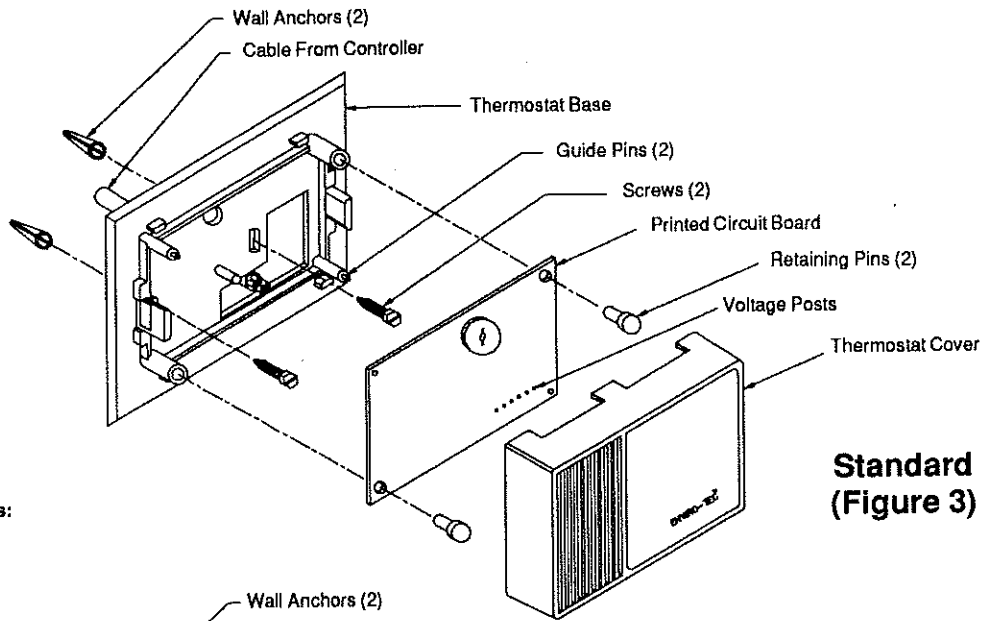
1. Required Wire Type for external control connections - 18 to 20 AWG stranded copper.
2. Wiring Diagrams - Refer to ENVIRO-TEC Submittal Data to determine correct terminals for wiring. Prior to wiring, insure that submittal sequence matches the control model number.
3. Control wiring to thermostat and optional remote contact closures should not be routed close to power (line voltage) wiring, electrical machinery or lighting, to reduce the possibility of electrical interference. Shielded cable is preferred but not required.

2.5 Controller Wiring

1. Remove depluggable connector from controller.
2. Insert the wire and tighten the screw.
3. Push connector back onto pins on controller board from which it was removed. Make sure it is firmly seated.

2.6 Thermostat Wiring

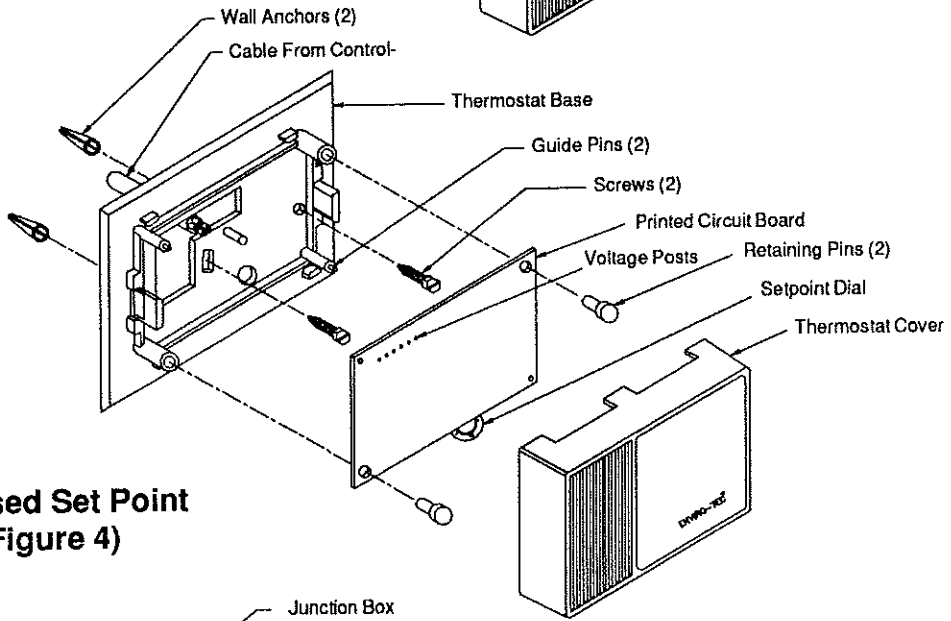
1. Remove cover from thermostat. If a locking cover has been provided, a 1/16 inch allen wrench will be required to remove the two allen screws which lock the cover in place.
2. Remove printed circuit board from base. If plastic retaining pins are tight, pry up the pins with a small screwdriver. Caution- Take care not to damage components on printed circuit board when prying out plastic retaining pins.
3. Strip 1/4 inch of insulation from the wire.
4. Insert wire in connector and tighten screw. Caution- Do not overtighten screws. Make sure connector clamps uninsulated portion of wire.
5. Repeat Steps 3 and 4 for all wire and terminals. Each terminal present should have a single wire inserted when wiring is complete.
6. Replace board on base using guide pins to align. Insert plastic retaining pins into large holes in printed circuit board and push through into base.



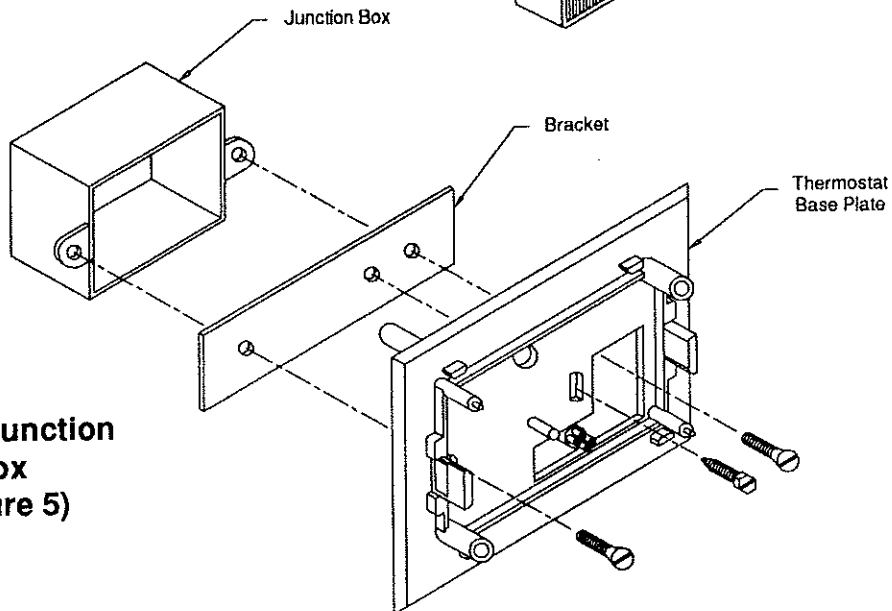
**Standard
(Figure 3)**

Thermostat Dimensions:

Height: 3.35"
Width: 4.5"



**Exposed Set Point
(Figure 4)**



**Single Junction
Box
(Figure 5)**

7. Replace cover, making sure vertical openings on face are positioned on left side. If the cover is locking, reinsert allen screws removed in Step 1 so that cover cannot be removed.

Note: Always verify that wiring is correct before applying power.

3.0 START-UP PROCEDURE

3.1 Initial Start-up Procedure

Always verify that wiring is correct before applying power.

1. Inspect all electrical connections to assure proper fit and location, in accordance with the proper wiring diagram. Remember that transformer leads carry a high voltage on the primary windings and lethal voltages may be present.
2. Check primary voltage to the (optional) transformer. Use caution, as the primary power connections to the transformer are lethal. Check output voltage from the transformer. This should be between 20 and 28 VAC. If outside these limits immediately remove power and determine the reason for improper power (See Troubleshooting - Section 4.0)
3. Check that there is primary airflow (or static pressure if the damper is closed) in the inlet duct.

Duct Temperature Adjustment

(Depending on the sequence of operation, may not be applicable)

A duct sensor is used to sense the presence of warm air at the inlet of the VAV terminal, causing the heater to change its operation to an option mode. The temperature at which this change occurs is adjusted by a potentiometer on the controller (see Figure 2). Set this potentiometer to the temperature at which the option mode is desired. Recommended minimum difference in warm and cold air temperatures is ten degrees Fahrenheit.

4.0 TROUBLESHOOTING

If the unit does not appear to be working properly, follow the procedures listed below to assist in locating the problem.

Note: With all electrical devices, there is the danger of shock; lethal voltages are present at the supply connections of all power transformers. Use caution when measuring operating voltages with these units.

The following table is a list of possible unit malfunctions, along with referenced unit diagnostic procedures, which follow.

Note: If the unit has a Duct Sensor, turn the Duct Sensor Setpoint Adjustment (Fig.2) fully clockwise before proceeding.

Troubleshooting			
STEP	Action	Result	Proceed to
4.1	All controls require 24 VAC, of sufficient VA to power all loads, at controller terminals 15 & 16.		4.2
4.2	Measure voltage at terminals 15 & 16.	Good Low or zero High	4.5 4.3 4.4
4.3	Check for a weak or undersized transformer, low primary voltage, loose or broken wires, or miswiring.		
4.4	Check for a damaged transformer, wrong transformer, or high primary voltage.		
4.5	Connect voltmeter to terminals 7 & 8 at the controller and measure 17.5-18.5 VDC.	Good Bad	4.7 4.6
4.6	Remove wires from terminals 7 & 8. Recheck voltage.	Good Bad	4.17 4.18
4.7	Connect voltmeter to thermostat terminals 1 and 2. Measure 17.5-18.5 VDC.	Good Bad	4.8 4.17
4.8	Connect voltmeter between terminal 3 and terminal 2.		
4.9	Vary Temperature Setpoint Adjustment [A] while observing voltmeter. Voltage should go from 9 VDC at 85 degrees to 7 VDC at 55 degrees.	Good Bad	4.11 4.10
4.10	Check all thermostat wiring.	Wiring good Wiring bad	4.19 4.17
4.11	Connect voltmeter to controller terminals 6 & 7. Vary Temperature Setpoint Adjustment [A] while observing voltmeter. Check that voltage goes from 9 VDC at 85 degrees to 7 VDC at 55 degrees.	Good Bad	4.12 4.17
4.12	Connect voltmeter to controller terminals 6 & 7. Turn Thermostat Setpoint Adjustment [A] fully CW. Meter should read 9 VDC.	Good Bad	4.13 4.17
4.13	All heat stages should be on.	Good Bad	4.14 4.18
4.14	Turn Temperature Setpoint Adjustment [A] fully CCW. Connect voltmeter between controller terminals 6 & 7. Meter should read 7 VDC.	Good Bad	4.15 4.17
4.15	All heat stages should be off.	Good Bad	4.16 4.18
4.16	Controls are operating correctly.		
4.17	Check all wiring. Correct wiring error or replace faulty wiring.		4.8
4.18	Replace Controller.		
4.19	Replace Thermostat		

5.0 WARRANTY POLICY

Environmental Technologies, Inc. and its Subsidiaries, hereinafter referred to as ETI, do hereby extend the following limited warranty of their manufactured products and components of complete assembled units e.g., Analog Electronic Controls.

All component parts manufactured by ETI are warranted against defects in materials and workmanship for a period of 36 months from the date of shipment.

Environmental Technologies, Inc. warranty is limited to replacement of product(s) and/or part(s) furnished by ETI. No replacement labor is included, nor extraneous labor or materials related to the repair and field replacement function. Further, ETI makes no other warranties, expressed or implied of its product(s), or any other product(s) so included as a component of its product(s). In no event shall ETI be deemed responsible for consequential charges or damages of any nature whatsoever and whosoever.



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