TE80SB

Programmable Digital Thermostat

INSTALLATION MANUAL

APPLICATION

The TE80SB Thermostat provides universal replacement of single-stage, 24Vac (20 mA to 1.5A) thermostats used in electric, gas, and oil heating and cooling systems. This thermostat is mercury free and requires no batteries. The thermostat also can be used to control single stage heat pumps.

The TE80SB uses advanced proportional plus integral (P+I) control for optimum temperature control and comfort.

Table 1. Description of Thermostat.

| Model	Mounting	System Selection	Fan Selection	Powering Method	Backlight
TE80SB	VERTICAL	COOL-OFF-HEAT	ON-AUTO	Power Stealing	Backlight

Fig. 1.Thermostat

FEATURES

- 7-Day programmable with 4 programs/day.
- Stylish design, replaces Honeywell T834C, White Rodgers 1E56 or Lux PSD150.
- LCD display with back lighting lit all the time.
- Power stealing for universal replacement. No common wire required. No batteries.
- Heat cycle rate can be selected (1,3,4,5,6,9,12) by software to suit many heating applications.
- Heating / cooling damper output to control either dampers or heat pump reversing valve.
- User options and set point are retained in the event of lost power.

SPECIFICATIONS

Table 2. Thermostat specifications.

Power	
Power Supply	24 Vac nominal, 18-30 Vac, 50/60 HZ.
Electrical Rating	
Heating rating	0.02 to 1.5 A continuous
Cooling rating	0.02 to 1.5 A continuous
Fan rating	0.02 to 0.5 A continuous
Note: The fan load plus the higher of the heating or cooling load must not exceed 1.5 Amp continuous	
TEMPERATURE RATINGS	
Temperature setting range	40 to 99 °F (4 to 37 °C)
Ambient temperature range	40 to 110 °F (4 to 43 °C)
Shipping temperature range	14 to 140 °F (-10 to 60 °C)
OPERATING RELATIVE HUMIDITY	5 to 90% RH, non-condensing
CYCLE RATES	
Cooling mode	4 Cycles Per Hour
Heating mode	1,3,4,5,6,9,12 Selectable Cycles Per Hour

DIMENSION
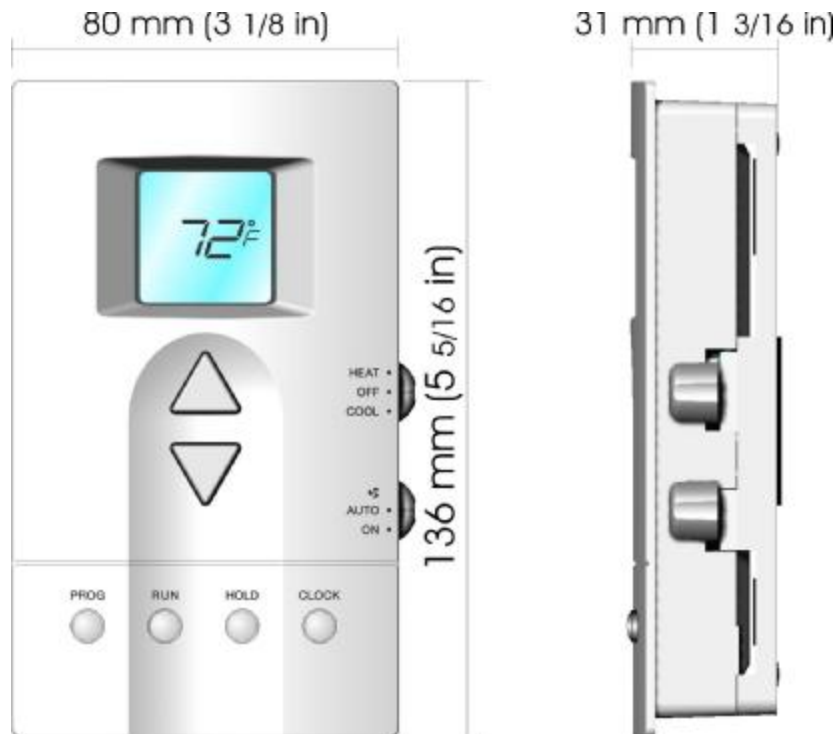
Fig. 2.Thermostat dimension

INSTALLATION

Read these instructions thoroughly before installing product. Failure to follow these instructions could damage the product or cause a hazardous condition. Check the voltage and current ratings on the product to ensure that it is suitable for your application. Installer must be a trained, experienced service technician. Check product for proper operation after installation.

⚠ CAUTION

Damage to heating and cooling system may occur. Disconnect power from the equipment at the main breaker/fuse block while installing the thermostat.

Mounting Location.

Mount the thermostat approximately 5 ft. (1.5m) above the floor in a location that is free from direct sunlight, heat from appliances, hot or cold air from ducts, concealed pipes and chimneys, and drafts or dead spots behind doors or in corners. Do not mount on exterior wall, if possible. Failure to locate thermostat mounting as indicated will result in poor temperature control.

NOTE: Level thermostat mounting is for appearance only and is not required for proper thermostat operation.

Mounting Thermostat

Take out the back plate by removing the locking screw (if any) at the bottom of the thermostat. Use flat head screw driver to unlock the snaps. Lift and pull it up to remove back plate.
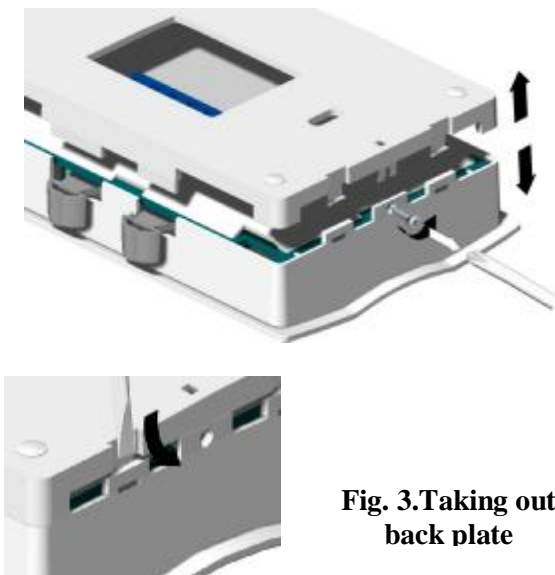

Fig. 3.Taking out back plate

Using back plate as a guide, mark two mounting holes on the wall. Drill two mounting holes. Place anchors (provided) into the holes until flush with the hole. Position back plate on the wall and thread the wires from the heating and cooling equipment through the wiring hole. Holding the back plate in place on the wall, secure it to the wall using mounting screws (provided).

Fig. 4.Installing back plate

Wiring

Pull the connector from the back of thermostat by inserting screw driver at the base of connector and gently lift up.
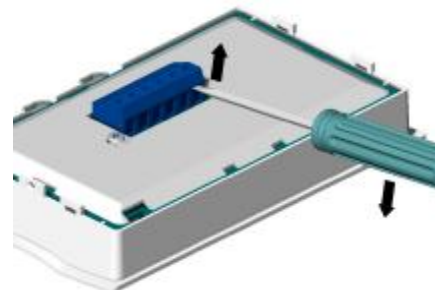

Fig. 5 Lifting the connector

Color-coded 18-22 gauge wire is recommended for wiring. All wiring must follow local electrical code located near each terminal.
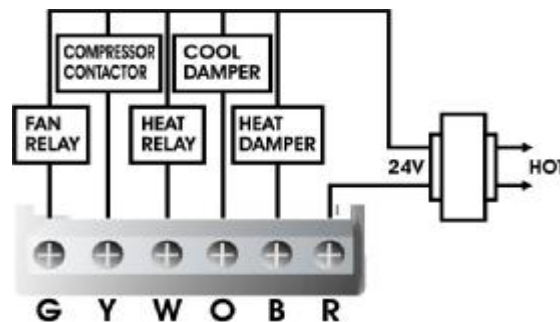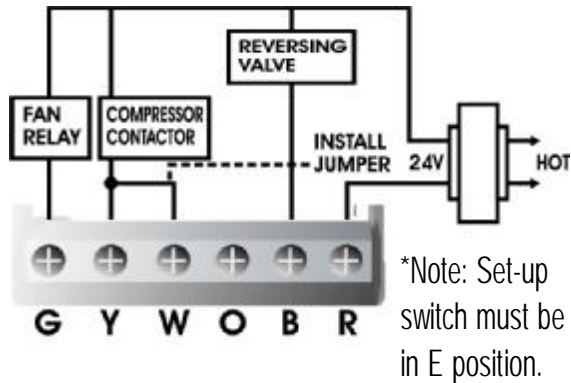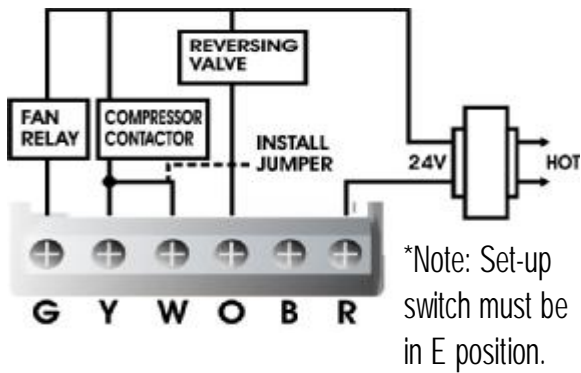

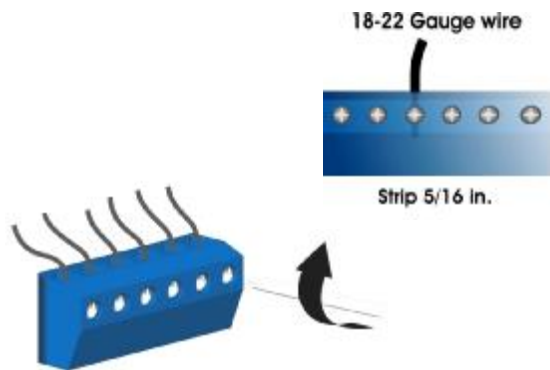**Fig. 6a.Wiring diagram.**

**HEAT PUMP WITH
HEAT ACTIVE
REVERSING VALVE**

*Note: Set-up switch must be in E position.

**HEAT PUMP WITH
COOL ACTIVE
REVERSING VALVE**

*Note: Set-up switch must be in E position.

**Fig. 6b. Wiring Diagram for
single stage heat pump.**

Loosen the terminal screw, strip the wire and connect the wire as shown in fig 7. Firmly tighten terminal screw when finished.


Fig. 7. Connecting wire.

Set-up switch (E/F)

⚠ **WARNING
Fire Hazard.**

Failure to set the set-up switch to the E position when electric resistance heat is used may result in the overheating of the electric heater elements due to improper fan operation.

The set-up switch is an internal switch (E,F) located near the wiring terminals. It is used to select proper fan operation for the heating system being used.

- The E position is for electric heat and single stage heat pump applications.
- The F position is for fuel applications.
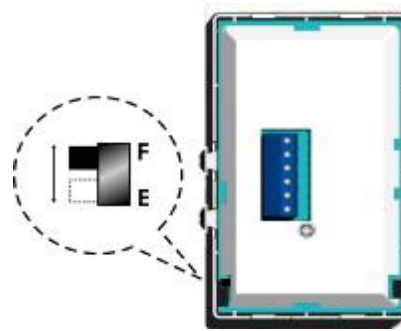
Fig. 8. Setup switch.

Place the terminal back to the thermostat, make sure it has the same orientation like in the picture described at the back. Snap the thermostat to its back plate.
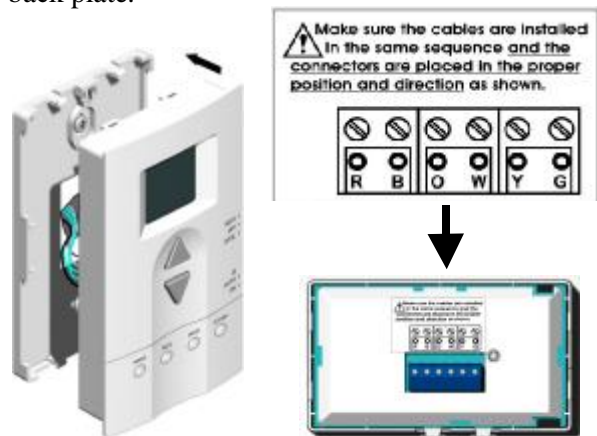
Fig. 9. Installing thermostat.

Secure the thermostat by tightening the screw provided to protect the thermostat from unwanted access.

Fig. 10. Secure the front cover.

INSTALLER SETUP
The following instructions provide information to test the heating / cooling equipment and to change operating parameters from the factory settings.

Enter Installer Setup
a. Use Δ or ∇ key to set the temperature set point to 52°F (or 11 °C).

OR
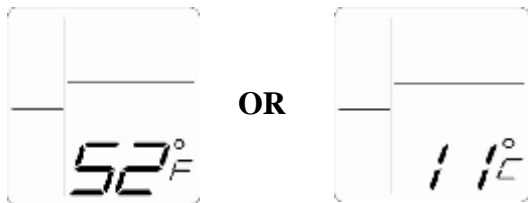
b. Press Δ and ∇ key simultaneously to enter installer setup.

Now follow the following steps to change each of the settings. Each time you press Δ key, you will advance to the next operating parameter. To go back you must re-enter the installer set up as described above.

Testing Heating / Cooling Equipment. (OP:01)

While in the installer setup, slide the mode switch to heat to operate the heating equipment or cool to operate the cooling equipment. The display will show either 00 or 01 on the lower right area and either heat or cool as selected by the mode switch.

a. If the equipment is off, press ∇ key to turn it on (if not, check the wiring or the equipment).
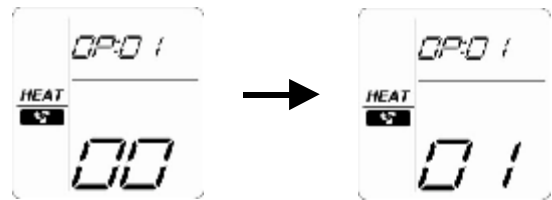
Example display showing   Example display showing
Heat equipment is off.   Heat equipment is on.

b. Press ∇ key again to turn off.
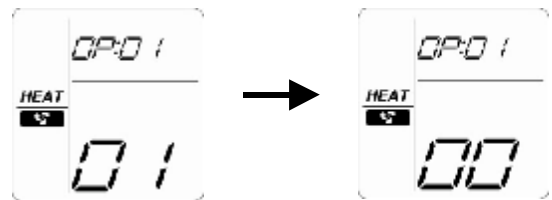
Example display showing   Example display showing
Heat equipment is on.   Heat equipment is off.

Setting °C / °F Indication. (OP:02)

While in the installer setup,

a. Press Δ key, the display will show °F/°C indication.

b. Press ∇ key to change °F or °C indication.

NOTE: Factory setting is °F indication.

Setting Heating Cycle Rate. (OP:03)

In cooling, the cycle rate is fixed at 4 Cycles per hour. To set the cycle rate in heating; while in installer setup,

a.   Press Δ key, the display will show the heat cycle rate.

`OP:03`
`06`

b. Press ∇ key to change the heat cycle rate to 1,3,4,5,6,9 or 12 cycles per hour.

`OP:03`
`09`

Note: The default is set at 6 cycle per hour. Table 4 is the recommended cycle rate. The installer should consult with the heating equipment manufacturer for proper use.

Table 4. Recommended cycle rate (CPH).

SYSTEM	CPH SETTING
Steam Gravity	1
Hydronic heat	3
Gas or Oil forced air	6
Electric heat	9

Note: If the equipment manufacture recommends a different rate use the rate specified by the equipment manufacture.

Setting cooling algorithm. (OP:04)

The cooling algorithm can be selected as normal or aggressive. For aggressive, the system will cool down the room to setting point faster than normal algorithm. However, an overshoot might be occurred in some situations.

a. Press Δ key to show the cooling algorithm.

`OP:04`
`00`

b. Press ∇ key to change algorithm.
 0 = Normal algorithm (default).
 1 = Aggressive algorithm.

`OP:04`
`01`

Setting Cooling Delay Time. (OP:05)

In some applications, there is a necessity to delay the operation of the cooling equipment for protection purposes. While in the installer setup,

a.   Press Δ key. The display will show cooling delay time.

`OP:05`
`00`

b.   Press ∇ key to select the cooling delay time (0,3,5 minutes).

`OP:05`
`03`

NOTE : The default setting is 3 minutes.

Temperature offset. (OP:06)

The temperature can be offset from +3 to -4 °F to eliminate the effect of installing location (e.g. direct sunlight). The thermostat will indicate room temperature by using actual reading plus (or minus) the offset value.

a. Press Δ key to show temperature offset.

`OP:06`
`0`

b. Press ∇ key to select offset value (default = -1 °F).

`OP:06`
`3`

NOTE : The default setting is -1 °F.

Time format. (OP:07)

The clock on the display can be selected to show either 24-hour or AM/PM format. While in the installer setup,

a. Press Δ key to show time setting.

b. Press ∇ key to select time setting as follow.

> 0 : 24-hour format.
> 1 : AM/PM format.

NOTE : The default setting is 1: AM/PM format.

Exit Installer Setup.

Press Δ key again to save all settings and exit to the normal operating mode.

NOTE: After return to normal operation, change the set point to the desired room temperature, otherwise the programmed set point will be used.

OPERATION

System Setting
Use mode switch for selecting system operation.

- Cool : The thermostat controls the cooling system.
- Heat : The thermostat controls the heating system.
- Off : Both heating and cooling are off.

Fan Setting
Fan switch settings are

On : Fan symbol is indicated on the display. The fan runs continuously. Used to improve air circulation and air quality.

Auto : Fan and Auto symbols are indicated on the display.

For cooling mode:
The fan starts and stops with cooling equipment.

For heating mode:
- If setup switch is at 'F' position, the fan is controlled directly by the heating equipment.
- If setup switch is at 'E' position, the fan starts and stop with heating equipment.

Minimum Off Timer

For cooling, when the thermostat calls for operation while the minimum off timer is not expired, the star symbol keeps flashing.

Back Lighting

The thermostat features a backlight that will illuminate all the time. The user can easily see the LCD screen under dim light situation.
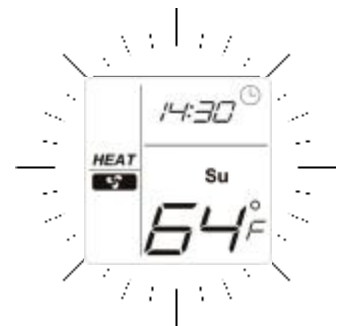
PROGRAMMING SCHEDULE

Select system switch in heat or cool mode.

Press "PROG" to enter program mode. Display will prompt to select day.

Press Δ or ∇ key to select desired programming period as below.

Week day	Week end

Table of programming period.

7-Day > Weekday > Weekend > Monday > Tuesday

∨

Sunday < Saturday < Friday < Thursday < Wednesday

Press 'PROG' to proceed.

The thermostat will display program 'P1' and prompt to adjust time.
Press Δ or ∇ key to select hour then press 'PROG' to proceed.

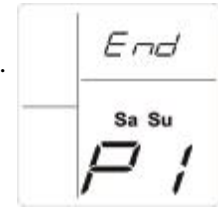Press Δ or ∇ key to select minute then press 'PROG' to proceed.

Press 'PROG' and select set point by pressing Δ or ∇ key.

Heat or Cool depends on system switch selection. If system switch is in off position, use COOL mode as default.

Press 'PROG' to confirm the setting.

Press 'PROG' again to proceed to next program.

After P4 is programmed, press 'PROG' once more to exit. Press the 'RUN' button at any time to exit program mode.

Default setting:

	Time	Week Day Heat	Cool	Week End Heat	Cool
P1	6:00 AM	70°F	74°F	70°F	74°F
P2	8:00 AM	65°F	78°F	70°F	74°F
P3	5:00 PM	70°F	74°F	70°F	74°F
P4	10:00 PM	65°F	78°F	65°F	78°F

Note : Default setting can be restored to memory by pressing HOLD and RUN buttons at the same time for 3 seconds.

ADJUSTING TEMPERATURE

Adjusting the temperature during any program will make the thermostat to temporarily use this set point until the next program.

During any program, press Δ or ∇ keys to change set point. Flashing 'KEY' icon indicates temporary mode.

The next program timer will cancel temporary mode. 'KEY' icon will stop flashing and set point will be updated to programmed data.

Press the 'RUN' button to cancel temporary mode and follow the program schedule.

> **Note : Press HOLD and CLOCK buttons at the same time to toggle between °C / °F.**

HOLD TEMPERATURE

Press the 'HOLD' button to maintain a setpoint for an extended period of time, for example, when going on vacation.

Pressing Δ or ∇ keys will change the hold temperature. 'KEY' icon indicates hold mode.

To cancel, press 'HOLD' button again until the key icon has disappeared. Set point will be updated to the programmed data.

Note that only the HOLD button can be used to exit the HOLD temperature.

CLOCK ADJUSTMENT

The clock needs to be adjusted when installed. The clock will be retained for a few hours in case of power interruption.

Press 'CLOCK' in normal mode to adjust the clock.

Press Δ or ∇ keys to set hour. Press 'CLOCK' to confirm and proceed.

Press Δ or ∇ keys to set minute. Press 'CLOCK' to confirm and proceed.

Press Δ or ∇ keys to set Day.

Press 'CLOCK' to confirm and exit.

> **Note : Press CLOCK and RUN buttons at the same time to toggle between AM/PM and 24H format.**

SYSTEM CHECKOUT

Cooling Checkout
**WARNING ! Do not operate in cooling mode when the outdoor temperature is below 50 °F (10 °C)
otherwise the compressor might be damaged.**

1. Slide mode switch to COOL, O terminal will get energized.
2. Pressing ∇ key to lower the set point below room temperature. The star symbol is shown on the display.
   If flashing, the compressor delay time is not yet expired. If lit steady, the compressor is on and terminal
   Y is energized.
3. Press ∆ key until set point is higher than room temperature. The star symbol is removed. The compressor
   is off and Y terminal is de-energized.

Heating Checkout

1. Slide mode switch to HEAT, B terminal will get energized.
2. Press ∆ key until the set point is higher than room temperature. The star symbol is shown on the display.
   The heating equipment is on and terminal W is energized.
3. Press the ∇ key until set point is lower than room temperature. The star symbol is removed. The heating
   equipment is off and W terminal is de-energized.

Fan Checkout

1. Slide FAN switch to ON position. The G terminal is energized and the fan should always be running.
2. Slide FAN switch to AUTO position,

q In cooling mode, the fan starts and stops with the cooling equipment.
q In heating mode when setup switch is in the F position, the fan is controlled directly by the heating
   equipment and may start a few minutes after the heating equipment turns on. When setup switch is in the
   E position, the fan starts and stops with the heating equipment.

Application Note

Attached 1000 ohm, 3 watt resistor is used in certain application to assure compatibility with power stealing thermostats where Fan does not come ON during call for Heat or Cool. Note that resistor has to be installed at the fan terminals and not at thermostat terminals.

To install the Resistor

1. Disconnect power supply.
2. Connect the resistor leads to the terminals as shown in the drawing.
3. Turn on the system power.

Air Handler Fan Board

C

G

1000 Ohm
3Watt
Resistor

G

Thermostat