

# Installation Instructions


## Outdoor Air Temperature Sensor

TSTATXXSEN01-B

**NOTE:** Read the entire instruction manual before starting the installation.

### SAFETY CONSIDERATIONS

Read and follow manufacturer instructions carefully. Follow all local electrical codes during installation. All wiring must conform to local and national electrical codes. Improper wiring or installation may damage thermostat sensor.

It is important to recognize safety information. This is the safety-alert symbol . When you see this symbol on the equipment and in instructions or manuals, be alert to the potential for personal injury.

Understand the signal words DANGER, WARNING, and CAUTION. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which **will** result in severe personal injury or death. WARNING signifies hazards which **could** result in personal injury or death. CAUTION is used to identify unsafe practices which **would** result in minor personal injury or product and property damage.

### INTRODUCTION

The Outdoor Air Temperature Sensor, Part No. TSTATXXSEN01-B, is an accessory for all thermostats that have outdoor air sensing capability. This also includes the new zoning systems. This sensor provides the homeowner with an indication of outdoor temperature, as well as supplying the control system with this information.

The TSTATXXSEN01-B sensor is new and completely interchangeable with the older style Part No. TSTATXXSEN01. It is improved for easier installation and wiring hook-up.

### INSTALLATION

There are 3 approved mounting locations for this sensor. Each location has certain advantages as well as disadvantages. Read each procedure discussed below carefully, then determine the best location for each given application.

#### PROCEDURE 1—MOUNTING SENSOR TO THE OUTSIDE WALL

The traditional mounting location has been on an outside wall. The only recommended wall for mounting is the north side of the building. The effects of the sun warming the other 3 walls (i.e. east, south, and west) can produce unacceptable temperature errors under the right conditions. If the north wall is used (as recommended), the mounting height can be from near ground level, all the way up into the eave. It is always best to mount the sensor at least 2- to 3-ft above grade level. The sensor should be mounted inside an ordinary or weatherproof outlet box. (See Fig. 1.)

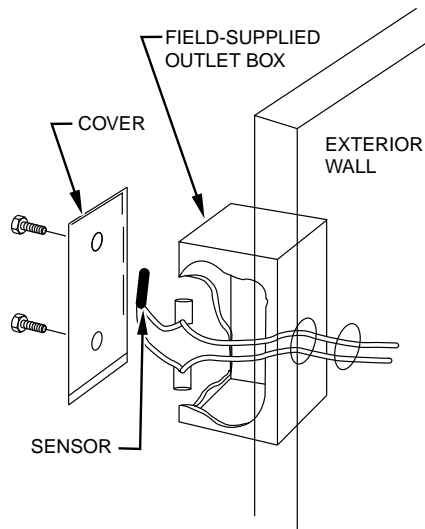
Advantages: This is the most accurate way of reading outdoor temperature.

Disadvantages: This application requires dedicated wire between the sensor location and the indoor termination point.

#### IF THIS PROCEDURE IS SELECTED:

Select the exact mounting location and route a 2-conductor interconnecting wire (through the building) between the indoor termination point and the outdoor sensor. For zoning systems, this will be terminals OAT and OATC at the Equipment Controller. For corporate thermostats and/or the Thermidstat Control™, the termination point will be terminals S1 and S2 at that device. It is acceptable to splice wires to complete this connection. However, allow sufficient extra wire for excess on each end to complete the connection. Solid thermostat or stranded, 22 AWG (or heavier wire) may be used. Use the supplied wire nuts to attach the sensor to the interconnecting wire. The wire nut connection should be located within the outlet box or within the inside wall (check your local codes). (See Fig. 1, 2, and 3.)

1. Drill a suitable hole in the building wall at the selected location.
2. Remove rear knockout from electric box, route wire through box, and attach to wall. Inset sensor in outlet box and make connections with supplied wire nuts. Note: Sensor polarity is not important, avoid sensor from touching inside edge of outlet box.
3. Seal wire entrance through the wall.
4. Attach cover to box. Note: Any moisture entering box will not harm sensor.
5. Connect other end as shown in Fig. 2 or 3.



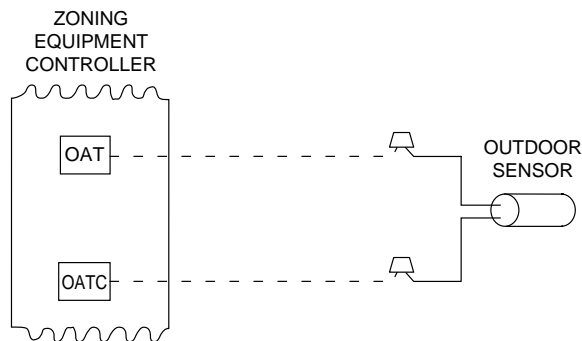
**Fig. 1—Mounting Sensor to Outside Wall**

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**Fig. 2—Thermostat or Thermidistat Control — Direct Connection**

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**Fig. 3—Zoning System — Direct Connection**

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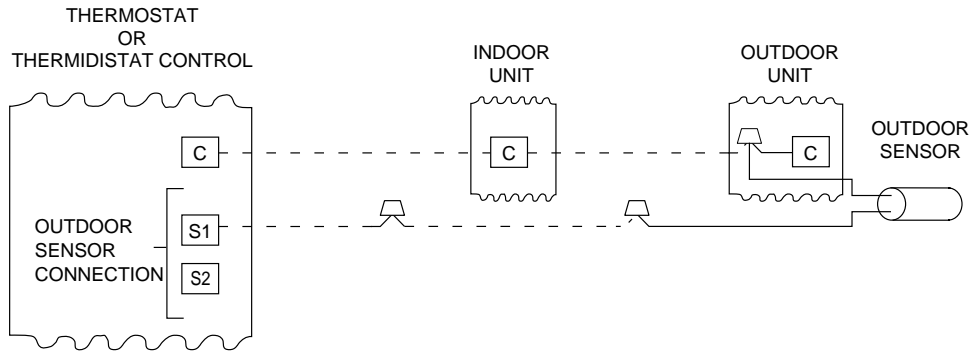
**PROCEDURE 2—MOUNTING SENSOR UNDER THE OUTDOOR UNIT**

Locating the sensor under the outdoor unit may simplify both wiring and mounting. There is the likelihood that an unused thermostat wire may exist between the indoor and outdoor unit. Use this wire to carry the temperature sensor signal from the outdoor to the indoor unit. However, another single wire must still be used between the indoor unit and the indoor termination point. (See Fig. 4 and 5.)

**NOTE:** The "C" connection between the indoor unit control, and the outdoor unit provides the ground path for the sensor signal. No wire is needed on S2 connection back to the thermostat, Thermidistat Control, or OATC (zoning system).

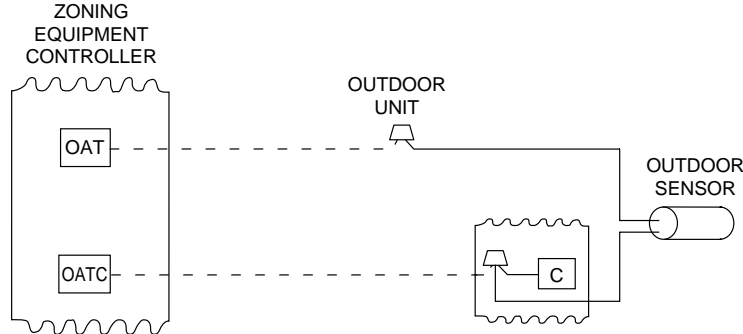
Advantages: Convenient mounting and wiring of outdoor air temperature sensor.

Disadvantages: a) The sun may have some effect when unit is not running. b) Defrost cycle (if heat pump) can introduce a small temperature error while defrosting. c) Snow and ice buildup under the outdoor unit may introduce error. d) Landscaping around outdoor unit may affect temperature reading.



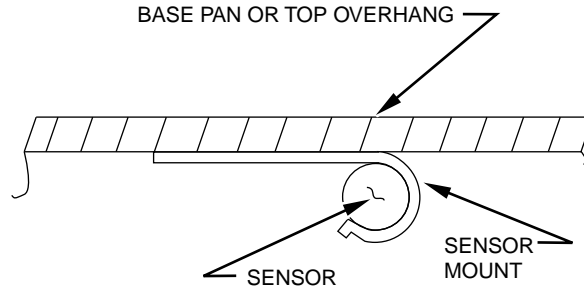
**Fig. 4—Thermostat or Thermidistat Control — Outdoor Unit Connection**

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**Fig. 5—Zoning System — Outdoor Unit Connection**

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**Fig. 6—Sensor Mounting**

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**IF THIS PROCEDURE IS SELECTED**

The sensor should be mounted under the northeast corner of the outdoor unit. Use the supplied sensor mounting clip. (See Fig. 6.) This has an adhesive pad to mount the sensor under the unit in a desirable location. Make sure the mounting surface is clean and dry. When applying, remove protective paper to expose pad surface and hold in place for 5 to 10 seconds ensuring good contact. However before doing all this, first check and make sure at least 1 unused wire is available in the control cable between the indoor and outdoor units. If one is available, no additional wire will be needed between indoor and outdoor units.

1. Remove door from outdoor unit and locate drain pan slot nearest the northwest corner of the unit. Depending on the amount of clearance under the unit, it may be easier to insert the sensor wires through the slot from the outside, or to slip the sensor itself through the slot from the inside. Select the easier of the two and route the sensor wires through the drain slot. After the sensor is located, snap it into the mounting clip. Wipe clean from under the base pan any loose dirt that may be on the mounting surface. Peel backing protective paper and firmly press sensor, holding it in place for a few seconds, to the underside of the base pan near the drain slot.
2. Route the sensor wires inside the unit to near the 24-vac connection terminals. Connect 1 sensor wire to the spare wire in the control cable using a supplied wire nut. Connect the other sensor wire to the "C" junction. (See Fig. 4 and 5.) At the indoor unit, a single wire must connect from the spare wire to terminal OAT (zoning system) or terminal S1 (thermostats and/or Thermidistat Control).

**PROCEDURE 3—MOUNTING SENSOR UNDER THE TOP OVERHANG OF OUTDOOR UNIT**

Locating the sensor under the top overhang of the outdoor unit could simplify both wiring and mounting. The sensor may also be mounted under the top overhang above the service ports. The wiring for this method will be the same as for mounting the sensor under the unit. (See Fig. 4 or 5.)

Advantages: a) Convenient mounting and wiring of outdoor air sensor. b) Avoids effects of ice and snow. c) Easiest to mount and wire.

Disadvantages: There may be significant heating effect from the sun while unit is off.

**IF THIS PROCEDURE IS SELECTED:**

1. Determine sensor location under overhang and wiring route to connection point. Snap sensor into mounting clip. (See Fig. 6.) Wipe from under the top any loose dirt that may be on the mounting surface. Peel backing from mounting clip and press to underside of top overhang, holding firmly for a few seconds.
2. Route sensor wires into control box wiring area and connect as instructed for Procedure 2 above. The wiring for this method will be the same as for mounting the sensor under the unit. (See Fig. 4 and 5.)

**TESTING COMPLETED WIRING**

When properly connected, the sensor will display outdoor temperature when the UP and DOWN buttons on the thermostat/Thermidistat Control/User Interface are pressed together. If the connection is wrong or the sensor is not reading, the display will indicate "--" (2 dashes) instead of outdoor temperature. Use this to test a new installation.

To further troubleshoot, use a digital volt meter and measure voltage across the sensor. This should be between 2- and 3-vdc at mid-range outdoor temperatures (i.e. 60-75°F). This same measurement should also be read at S1 and S2 (thermostat and/or Thermidistat Control) or OAT and OATC (zoning system).

The terminal voltages will be about 5-vdc with the sensor disconnected. The sensor itself can be checked by measuring its resistance (with sensor disconnected). Values are given in Table 1.

**Table 1—Temperature/Ohm Relationship (°F/Ω)**

TEMPERATURE (°F)	OHMS (Ω)	TEMPERATURE (°F)	OHMS (Ω)
30	34,480	76	10,250
32	32,630	78	9750
34	30,760	80	9300
36	29,220	82	8840
38	27,470	84	8432
40	26,020	86	8042
42	24,680	88	7668
44	23,320	90	7310
46	22,070	92	6993
48	20,910	94	6661
50	19,830	96	6368
52	18,820	98	6085
54	17,870	100	5811
56	16,920	102	5571
58	16,160	104	5313
60	15,260	106	5088
62	14,530	108	4869
64	13,790	110	4660
66	13,090	112	4450
68	12,480	114	4268
70	11,860	116	4091
72	11,270	118	3918
74	10,750	120	3750