

X4148 Outdoor Sensor

INSTALLATION INSTRUCTIONS

APPLICATION

This X4148 Outdoor Sensor is used with the X4146 and X4147 Thermostats.

SPECIFICATIONS

Operating Ambient Temperature Range:

-40 to 120°F (-40 to 49°C).

Display Range:

-40 to 127°F (-40 to 53°C).

Sensor Accuracy:

+/-1.5°F at 70°F (+/- .84 at 21°C)

Operating Relative Humidity:

5% to 95% non-condensing.

Dimensions in in. (mm):

2-1/4 (57) x 3/8 (10) with 60 (1524) leadwires.

INSTALLATION

When Installing this Product...

1. Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Check the ratings given in the instructions and on the product to make sure the product is suitable for your application.
3. Installer must be a trained, experienced service technician.
4. After installation is complete, check out product operation as provided in these instructions.



CAUTION

Electrical Shock Hazard.
Can cause electrical shock or equipment damage.
Disconnect power supply before connecting wiring.

Location and Mounting (Fig. 1)

Mount the sensor where:

- cannot tamper with settings.
- there is good air circulation.
- it can measure true outdoor ambient temperature.
- surface is flat.
- wire distance between outdoor sensor and thermostat is less than 200 feet.

Do *not* mount the sensor:

- in direct sunlight.
- where hot or cold air blows on the sensor. Discharge line from an outdoor compressor unit, vent or fan causes inaccurate temperature readings.
- where snow, ice or debris can cover it.

Use the following steps to mount the sensor:

1. Remove the sensor from the mounting clip.
2. Mark the area on the location selected for mounting the sensor mounting clip.
3. Mount the clip.

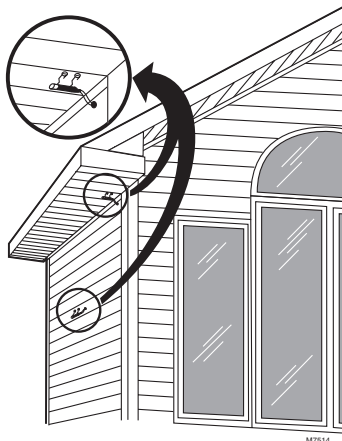


Fig. 1. Typical locations for outdoor sensor.



Wiring

CAUTION

Electrical Interference (Noise) Hazard.
Can cause erratic system operation.

Keep wiring at least one foot away from large inductive loads such as motors, line starters, lighting ballasts and large power distribution panels.

Use shielded cable to reduce interference when rerouting is not possible.

IMPORTANT

Erratic temperature readings from a sensor can occur as a result of any of the wiring practices described below. Avoid these practices to assure correct operation. Use shielded cable to reduce interference if rerouting of sensor wiring is not possible.

- Be sure wires have a cable separate from the thermostat cable.
- Do not route temperature sensor wiring with building power wiring, next to control contactors or near light dimming circuits, electric motors or welding equipment.
- Avoid poor wiring connections.
- Avoid intermittent or missing building earth ground.

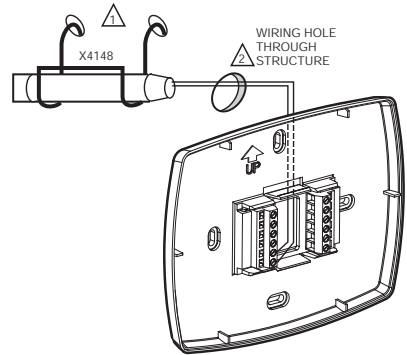
CAUTION



Electrical Shock Hazard.
Can cause electrical shock or equipment damage.

Disconnect power supply before connecting wiring.

Wiring must comply with applicable codes, ordinances and regulations:

1. Wire the outdoor sensor to S1 and S2 terminals on the thermostat. If leadwire provided with outdoor sensor is not long enough (60 in.), run a cable to a hole at the outdoor sensor location.
 - a. Using color-coded, 18-gauge thermostat wire is recommended. For example of general wiring of outdoor sensor, see Fig. 2.
 - b. Pigtail wiring can be used.
2. Mount the outdoor sensor in its mounting clip.
3. Plug wiring hole using nonhardening caulk or putty.



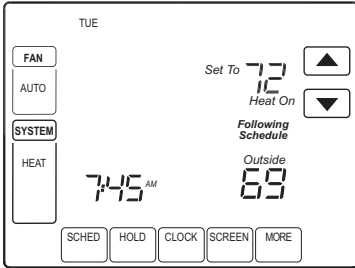
-  USE APPROPRIATE MOUNTING MEANS FOR THE TYPE OF STRUCTURE.
-  PLUG WIRING HOLE WITH NON-HARDENING CAULK OR PUTTY.

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Fig. 2. Wiring X4148 Outdoor Sensor to thermostat.

OPERATION

Once installed and Thermostat Installer Setup Number 0340 is set to 1 or 2, the outside temperature can be displayed on the thermostat. See Fig. 3.



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Fig. 3. Outside temperature reading on TH8000 Series Thermostat.

The outdoor sensor converts outdoor ambient temperature to a resistance that the thermostat can interpret.

The sensor has a negative temperature coefficient (TC), which means that resistance decreases as the temperature increases. See Table 1.

CHECKOUT

Allow the outdoor sensor to absorb outdoor air for a minimum of twenty minutes before taking a reading.

With an accurate thermometer ($\pm 1^\circ\text{F}$ [0.5°C]) measure the temperature at the sensor location, allowing time for the thermometer to stabilize before reading.

To verify sensor resistance, remove one wire from one of the sensor 60-in. leadwires. Use an ohmmeter to measure the resistance across the sensor. Then verify the sensor accuracy with the temperature/resistance in Table 1.

CALIBRATION

The outdoor sensor is calibrated at the factory and cannot be recalibrated in the field.

Table 1. Sensor Resistance at Outdoor Temperature .

Outdoor Temperature		Ohms of Resistance
$^\circ\text{F}$	$^\circ\text{C}$	
-20	-28.9	106926
-18	-27.8	100923
-16	-26.7	95310
-14	-25.6	90058
-12	-24.4	85124
-10	-23.3	80485
-8	-22.2	76137
-6	-21.1	72060
-4	-20.0	68237
-2	-18.9	64631
0	-17.8	61246
2	-16.7	58066
4	-15.6	55077
6	-14.4	53358
8	-13.3	49598
10	-12.2	47092
12	-11.1	44732
14	-10.0	42506
16	-8.9	40394
18	-7.8	38400

Table 1. Sensor Resistance at Outdoor Temperature (Continued).

Outdoor Temperature		Ohms of Resistance
°F	°C	
20	-6.7	36519
22	-5.6	34743
24	-4.4	33063
26	-3.3	31475
28	-2.2	29975
30	-1.1	28558
32	0.0	27219
34	1.1	25949
36	2.2	24749
38	3.3	23613
40	4.4	22537
42	5.6	21516
44	6.7	20546
46	7.8	19626
48	8.9	18754
50	10.0	17926
52	11.1	17136
54	12.2	16387
56	13.3	15675
58	14.4	14999
60	15.6	14356
62	16.7	13743
64	17.8	13161
66	18.9	12607
68	20.0	12081
70	21.1	11578
72	22.2	11100
74	23.3	10644
76	24.4	10210

Table 1. Sensor Resistance at Outdoor Temperature (Continued).

Outdoor Temperature		Ohms of Resistance
°F	°C	
78	25.6	9795
80	26.7	9398
82	27.8	9020
84	28.9	8659
86	30.0	8315
88	31.1	7986
90	32.2	7672
92	33.3	7372
94	34.4	7086
96	35.6	6813
98	36.7	6551
100	37.8	6301
102	38.9	6062
104	40.0	5834
106	41.1	5614
108	42.2	5404
110	43.3	5203
112	44.4	5010
114	45.6	4826
116	46.7	4649
118	47.8	4479
120	48.9	4317

