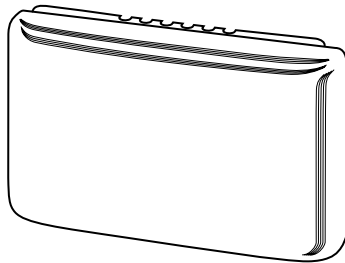
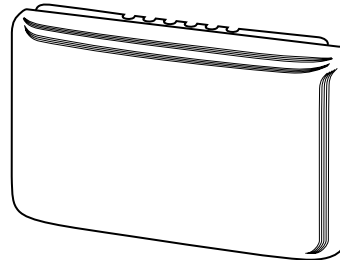


Operator: Save these instructions for future use!

**FAILURE TO READ AND FOLLOW ALL INSTRUCTIONS CAREFULLY BEFORE
INSTALLING OR OPERATING THIS CONTROL COULD CAUSE PERSONAL
INJURY AND/OR PROPERTY DAMAGE.**

INDOOR REMOTE SENSOR**OUTDOOR REMOTE SENSOR****Outdoor Probe****Interior Mounting Base****PRECAUTIONS****NOTE**

If in doubt about whether your wiring is millivolt, line, or low voltage, have it inspected by a qualified heating and air conditioning contractor or electrician.

Do not exceed the specification ratings.

All wiring must conform to local and national electrical codes and ordinances.

This control is a precision instrument, and should be handled carefully. Rough handling or distorting components could cause the control to malfunction.

The remote sensors cannot be used with systems where power interruptions are part of normal system operation.

CAUTION

To prevent electrical shock and/or equipment damage, disconnect electric power to system at main fuse or circuit breaker box until installation is complete.

WARNING

Do not use on circuits exceeding specified voltage. Higher voltage will damage control and could cause shock or fire hazard.

Do not short out terminals on gas valve or primary control to test. Short or incorrect wiring will damage thermostat and could cause personal injury and/or property damage.

SPECIFICATIONS

The F145-1328 remote sensor is approved for indoor use only.

Temperature range: 40° to 99°F

Operating humidity range: 0 to 90% RH (non-condensing).

20 gauge, three-conductor shielded cable must be used for all remote sensor wiring.

The F145-1378 remote sensor is approved for outdoor use only.

Temperature range of outdoor probe: -40° to 140°F

20 gauge, three-conductor shielded cable must be used for all remote sensor wiring.

INSTALLATION

INDOOR SENSOR SELECT SENSOR LOCATION

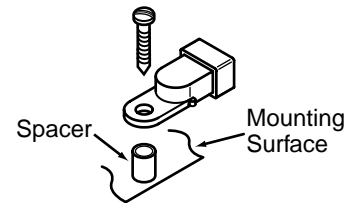
Proper location insures that the remote sensor will provide a comfortable home or building temperature. Observe the following general rules when selecting a location:

1. The remote sensor can be located a **maximum** of 300 feet from the thermostat.
2. Locate sensor about 5 ft. above the room floor level.
3. Install sensor on a partitioning wall, not on an outside wall.
4. Never expose sensor to direct light from lamps, sun, fireplaces or any temperature radiating equipment.
5. Avoid locations close to windows, adjoining outside walls, or doors that lead outside.
6. Avoid locations close to air registers or in the direct path of air from them.
7. Make sure there are no pipes or duct work in that part of the wall chosen for the sensor location.
8. Never locate sensor in a room that is normally warmer or cooler than the rest of the home (such as the kitchen) or building.
9. Avoid locations with poor air circulation, such as behind doors or in alcoves.
10. In the home, the living or dining room is normally a good location, provided there is no cooking range or refrigerator on opposite side of wall.

OUTDOOR SENSOR SELECT SENSOR LOCATION

Proper location insures that the remote sensor will provide a correct outdoor temperature reading. Observe the following general rules when selecting a location:

1. The interior mounting base can be located a **maximum** of 300 feet from the thermostat.
2. Install the interior mounting base within 12 ft. of the intended outdoor probe location.
3. Never install the outdoor probe where it will be exposed to direct light from lamps, sun, fireplaces or any temperature radiating equipment.
4. Make sure there are no pipes or ductwork in the wall chosen for the base location.
5. Outdoor temperature measurement requires installing the probe outdoors. Good probe locations would be under a bay window or overhang, out of direct sunlight. Direct sun exposure will affect sensed temperature. Install probe with spacer to obtain a more accurate temperature.



6. Although connected to the probe wire for outdoor temperature sensing, the interior mounting base must be placed **indoors**. Therefore, the interior mounting base must be installed near the perimeter of the building, so that the probe wire can be run through to the outside of the structure and placed in the selected (shaded) location. The outdoor probe wire is 12 feet long (**and should not be cut or spliced**), so plan the placement of both the probe and interior mounting base accordingly. Any excess wire may be coiled or bundled. The probe should be connected to E2 as shown in figure 2.

WIRING

⚠ CAUTION

Do not allow the 3-conductor wire to be pinched between the sensor and the wall.

Check wire connections before applying power. Improper connections will lead to permanent damage to the sensor.

20 Gauge Shielded cable must be used. Cable shield must be connected to "-" or S3 on the THERMOSTAT ONLY.

Connection Cross Reference Thermostats and Remote Sensors

Old Terminal (Thermostat or Remote)	New Terminal (Thermostat or Remote)
S1	+
S2	S
S3	-

Old/New Remote Terminal Designations

Model Number	Terminal Designation		
	S1	S2	S3
*F145-1049, *F145-1170	S1	S2	S3
F145-1328, F145-1378	+	S	-
*Models no longer available	Sensor Positive	Sensor Return Signal	Sensor Negative

INDOOR SENSORS

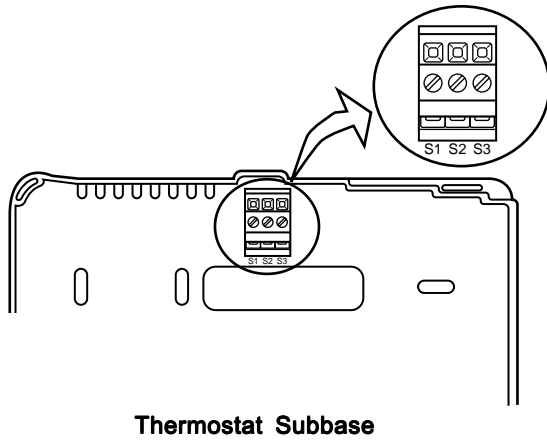
Model Number	Color	Dimensions	Application
F145-1328	Classic White	2 ¹ / ₈ " x 3 ¹ / ₂ " x 3 ³ / ₄ "	Compatible with all White-Rodgers Thermostats with Indoor Remote Sense

1. 1F93-380, 1F95-371, 1F95-377 and 1F95-391 thermostats average or weight sensor priority in multiple remote applications.

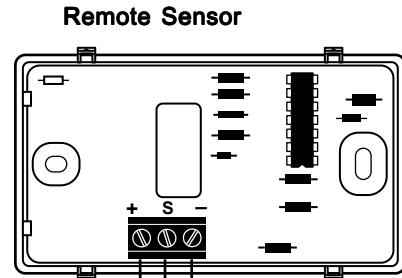
OUTDOOR SENSORS

Model Number	Color	Dimensions	Application
F145-1378	Classic White	2 ¹ / ₈ " x 3 ¹ / ₂ " x 3 ³ / ₄ " with 12 ft. sensor lead	Compatible with all White-Rodgers Thermostats with Outdoor Remote Sense

1. Outdoor Sensor provides outdoor temperature to thermostat display. Not used for averaging or cycle rate calculations except on 1F95-391.

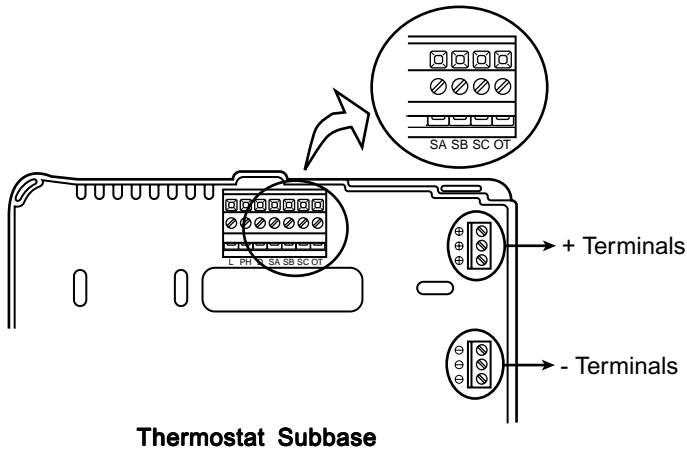


Note: Also connect shield of 20 gauge 3 connector cable to - or S3 on thermostat subbase.



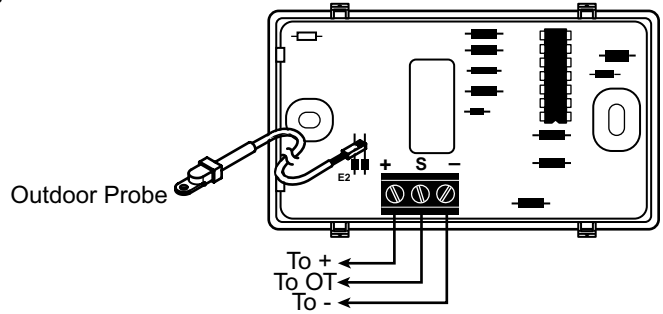
To + or → To S1
 To S or → To S2
 To - or → To S3

Figure 1 – Single Stage Thermostat Remote Sensor Wiring (F145-1328)

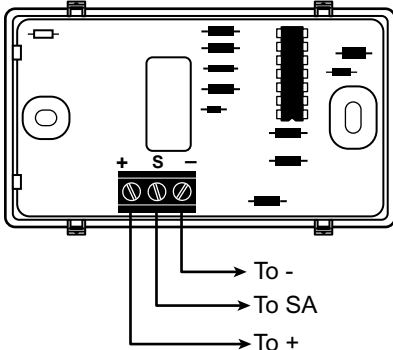


Note: Also connect shield of 20 gauge 3 connector cable to - or S3 on thermostat subbase.

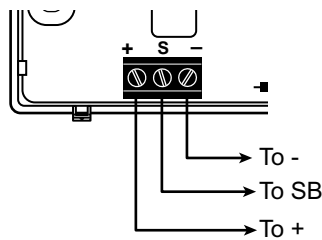
Remote Outdoor Sensor



Remote Indoor Sensor A



Remote Indoor Sensor B



Remote Indoor Sensor C

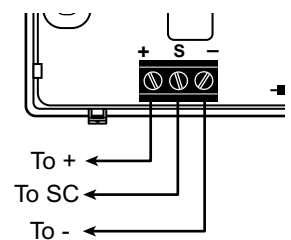


Figure 2 – Staging Thermostat Multi-Stage or Heat Pump Indoor/Outdoor Remote Sensor Wiring (F145-1328/F145-1378)

CONFIGURATION

Comfort-Set II

Single Stage Models: Verify jumper wire **W-22** on the back of the thermostat (not the subbase) has been clipped.

Multi-stage and Heat Pump Models: Verify jumper wire **W-18** on the back of the thermostat (not the subbase) has been clipped.

Comfort-Set III/Comfort-Set 90/90 Series

Single Stage Models: Verify jumper wire **W-922** on the back of the thermostat (not the subbase) has been clipped. You must also enable the remote sensor option in the Installation Instructions, Configuration Menu.

Multi-stage and Heat Pump Models: When installing a remote sensor you must enable the remote sensor option in the Installation Instructions, Installer Menu.

REMOTE SENSOR CALCULATED PRIORITY AVERAGE

1F93-380, 1F94-371, 1F95-371, 1F95-377, 1F95-391

Single stage thermostats accept only 1 remote sensor. 90 Series multi-stage and heat pump thermostats accept up to 3 indoor remote sensors and can be assigned sensor priorities.

Tables 1-3 show how priority (LO, AVG, HI) effects the room temperature calculation. The example below table three shows the calculation of each remote sensor and how it uses them to arrive at room temperature average.

Table 1: Remote Sensor A configured as a LO priority sensor

Remote Sensor	Sensor Priority	Priority Multiplier	Room Temperature	Averaging Calculation
SA	LO	1	70°F (Sensor Temp.)	1 x 70 = 70 (Priority Multiplier x Room Temp.)

Table 2: Remote Sensor B configured as a AVG priority sensor

Remote Sensor	Sensor Priority	Priority Multiplier	Room Temperature	Averaging Calculation
SB	AVERAGE	2	75°F (Sensor Temp.)	2 x 75 = 150 (Priority Multiplier x Room Temp.)

Table 3: Remote Sensor C configured as a HI priority sensor

Remote Sensor	Sensor Priority	Priority Multiplier	Room Temperature	Averaging Calculation
SC	HI	4	80°F (Sensor Temp.)	4 x 80 = 320 (Priority Multiplier x Room Temp.)

The example below lists three sensors each with a different priority and room temperature. All three sensors are combined in the calculation to display the average temperature. The priority multiplier shown in the tables above causes a sensor with low priority to carry less weight in the calculated average. A sensor with a HI priority setting contributes more to the calculated average. Assume that the building in which the thermostat is located has three indoor remote sensors (SA, SB, SC) that have different room temperatures (70, 75, 80). The calculated average will be displayed as the room temperature shown in the example below.

Example: Remote Sensors A, B, and C configured as a LO, AVG, and HI priority sensors

Remote Sensor	Sensor Priority	Priority Multiplier	Room Temperature	Averaging Calculation
SA	LO	1	70°F (Sensor Temp.)	1 x 70 = 70 (Priority Multiplier x Room Temp.)
SB	AVERAGE	2	75°F (Sensor Temp.)	2 x 75 = 150 (Priority Multiplier x Room Temp.)
SC	HI	4	80°F (Sensor Temp.)	4 x 80 = 320 (Priority Multiplier x Room Temp.)
				Avg. Calc. (540)/Sum Priority Mult. (7)
				540/7 = 77°F (Calculated Displayed Temp.)

REMOTE SENSOR TROUBLESHOOTING GUIDE

Comfort-Set II

Single Stage Models: Verify jumper wire **W-22** on the back of the thermostat (not the subbase) has been clipped.

Multi-stage and Heat Pump Models: Verify jumper wire **W-18** on the back of the thermostat (not the subbase) has been clipped.

Comfort-Set III/Comfort-Set 90/90 Series

Single Stage Models: Verify jumper wire **W-922** on the back of the thermostat (not the subbase) has been clipped. You must also enable the remote sensor option in the Installation Instructions, Configuration Menu.

Multi-stage and Heat Pump Models: When installing a remote sensor you must enable the remote sensor option in the Installation Instructions, Installer Menu.

Troubleshooting Chart

To function correctly and read temperature accurately, the thermostat (when set up for a remote as outlined above) must have constant 24-volt power. If the thermostat temperature is steadily dropping, reading low, or reads **08°** when a remote sensor is installed, it can be traced to one of the three following conditions.

Condition	Test	Comments
1. Loss of 24-volt power.	On models with batteries, remove the batteries and re-install thermostat. If the display is blank, check heating and cooling system to determine why 24-volt power is absent.	For the sensor to read correctly, the 24-volt system power must be present. Some systems may require an isolation relay to provide constant power to the thermostat. Limit or safety devices in the equipment can also cause a power interruption.
2. A broken wire on S1, S2 and S3 or (+, SA, -) from the thermostat to the remote.	Disconnect sensor wires at thermostat. Attach a short piece (2') of three-wire shielded cable to S1, S2 and S3 or (+, SA, -) on the subbase. Bring the remote sensor to the thermostat location and attach S1, S2 and S3 or (+, S, -) respectively. Reattach thermostat. If the temperature begins to climb (slowly), it is reading correctly. If it reads correctly with the 2' length but improperly when attached to the wire run, it indicates a fault in the wire run.	Repair or replace the 3 wire shielded cable. Be sure the remote wire run is not parallel to line voltage wires that carry heavy inductive loads, or across fluorescent light ballasts that may cause an inductance to be transmitted to the thermostat.
3. A shorted or damaged remote sensor.	Because it is an electronic sensor, there are no Ohm values to test. If correct conditions as listed in 1 & 2 above and the temperature stays at or near 08° , it indicates a shorted or damaged remote sensor.	Replace remote sensor.

Note: Digital thermostats and remote sensors acclimate very slowly to temperature change. It may take an hour or more for the temperature to acclimate to the room temperature from a low temperature reading as outlined above. To expedite the room temperature display use the reset instructions listed in the installation instructions for the thermostat model you are working with. When reset, the thermostat will default to a room temperature of 70° and begin sensing room temperature. Be sure to reconfigure the installer menu for a remote sensor because the reset function may cancel remote sensing.

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