

## TH5110D Non-programmable Thermostat

### INSTALLATION INSTRUCTIONS

### APPLICATION

The TH5110D Non-programmable Thermostat provides electronic control of 24 Vac, single-stage heating and

cooling systems or 750 mV heating systems. See Table 1 for a description.

**Table 1. TH5110D Thermostat description.**

Feature	Description
Powering Methods	<ul style="list-style-type: none"> <li>• Battery only</li> <li>• Common wire only</li> <li>• Common wire with battery backup</li> </ul>
System Types (Up to 1 Heat, 1 Cool)	<ul style="list-style-type: none"> <li>• Gas, oil or electric heat with air conditioning</li> <li>• Warm air, hot water, high efficiency furnaces, heat pumps, steam and gravity</li> <li>• Heat only— includes power to open and power to close zone valves (Series 20) and normally-open zone valves</li> <li>• Heat only with fan</li> <li>• Cool only</li> <li>• 750 mV heating systems</li> </ul>
Changeover	Manual or auto changeover selectable
System Setting	Heat-Off-Cool-Auto
Fan Setting	Auto-On



### MERCURY NOTICE

If this control is replacing a control that contains mercury in a sealed tube, do not place your old control in the trash.

Contact your local waste management authority for instructions regarding recycling and the proper disposal of the old thermostat.



# INSTALLATION

## When installing this product...

1. Read these instructions carefully. Failure to follow these instructions can 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 completing installation, use these instructions to check out the product operation.

### CAUTION

**Electrical Hazard.**  
**Can cause electrical shock or equipment damage.**  
 Disconnect power before beginning installation.

## Select Thermostat Location

Select a location for the thermostat about 5ft (1.5m) above the floor in an area with good air circulation at average temperature. See Fig. 1.

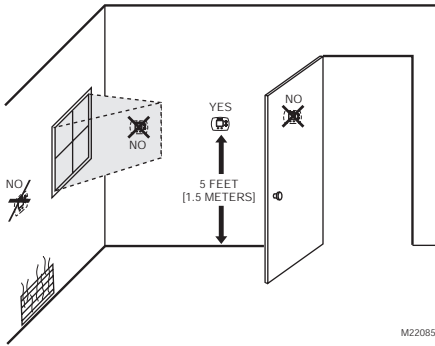


Fig. 1. Select thermostat location.

Do not install the thermostat where it can be affected by:

- Drafts or dead spots behind doors and in corners.
- Hot or cold air from ducts.
- Radiant heat from sun or appliances.
- Concealed pipes and chimneys.
- Unheated (uncooled) areas such as an outside wall behind the thermostat.

## Separate Wallplate from Thermostat

1. Separate the wallplate from the thermostat. See Fig. 2.

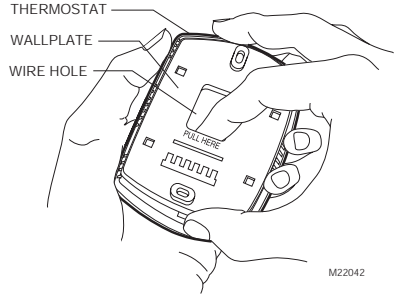


Fig. 2. Separate wallplate from thermostat.

## Install Wallplate (See Fig. 3.)

Mount the thermostat horizontally on the wall:

1. Pull the wires through the wire hole on the wallplate.
2. Position the wallplate on the wall with the arrow pointing up. Level the wallplate for appearance only.
3. Use a pencil to mark the mounting holes.
4. Remove the wallplate from the wall and drill two 3/16-in. holes in the wall (if drywall) as marked. For firmer material such as plaster, drill two 7/32-in. holes. Tap the wall anchors (provided) into the drilled holes until flush with the wall.
5. Pull the wires through the wire hole on the wallplate and position the wallplate over the wall anchors.
6. Insert the mounting screws into the wall anchors and tighten.

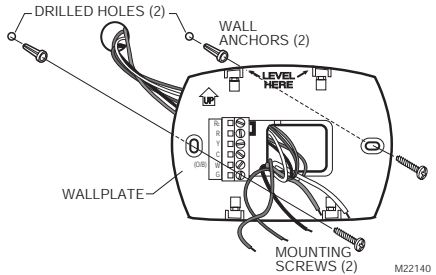


Fig. 3. Install wallplate.

# WIRING

All wiring must comply with local electrical codes and ordinances. Refer to Table 2 for descriptions of terminal designations. See Fig. 6-13 for wiring diagrams for specific equipment applications.

## CAUTION

**Electrical Hazard.**  
**Can cause electrical shock or equipment damage.**  
 Disconnect power before wiring.

### IMPORTANT

Use 18-22 gauge thermostat wire. Shielded cable is not required.

1. Loosen the screw terminals that are used for the application. Insert the wires into the terminal block and tighten each screw terminal. See Fig. 4.

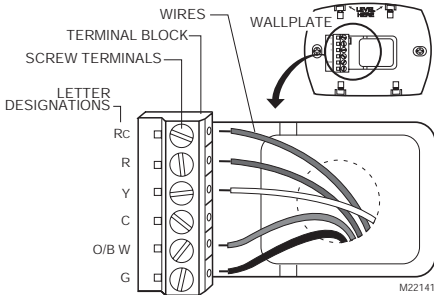


Fig. 4. Insert wires into terminal block.

2. Push excess wire back into the wall opening and restrict wires to the shaded area. See Fig. 5.

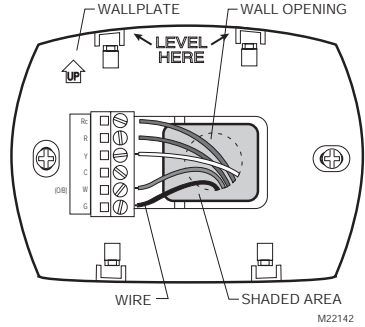


Fig. 5. Restrict wires to shaded area of wire hole.

3. Plug the wall opening with nonflammable insulation to prevent drafts from affecting the thermostat.

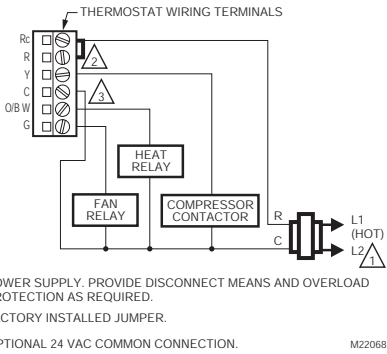
Table 2. Terminal designation descriptions.

Terminal Designation	Description
Rc (see Note 1)	Power for cooling—connect to secondary side of cooling system transformer
R (see Note 1)	Power for heating—connect to secondary side of heating system transformer
Y	Compressor contactor
C (see Note 2)	Common wire from secondary side of cooling system transformer
O/B W (see Note 3)	Heat relay or changeover valve terminal for heat pumps
G	Fan relay

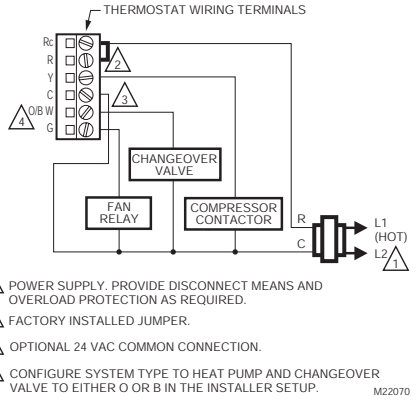
### NOTES:

1. When used in a single-transformer system, leave metal jumper in place between Rc and R. If used on a two-transformer system, remove metal jumper between Rc and R.
2. Common wire is optional when thermostat is used with batteries.
3. If thermostat is configured for a heat pump in the Installer Setup, configure changeover valve for cool (O-factory setting) or heat (B).

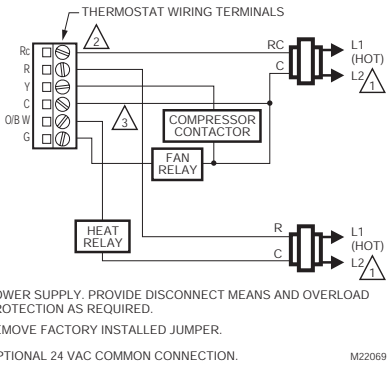
# WIRING DIAGRAMS



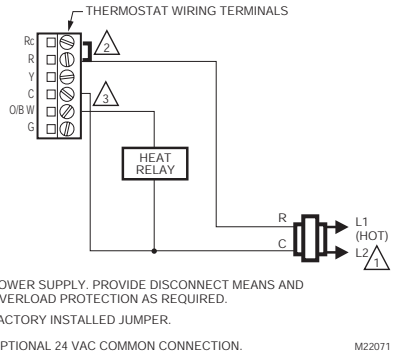
**Fig. 6. Typical hookup of conventional 1H/1C system with one transformer.**



**Fig. 8. Typical hookup of 1H/1C heat pump.**



**Fig. 7. Typical hookup of conventional 1H/1C system with two transformers.**



**Fig. 9. Typical hookup of heat only system.**

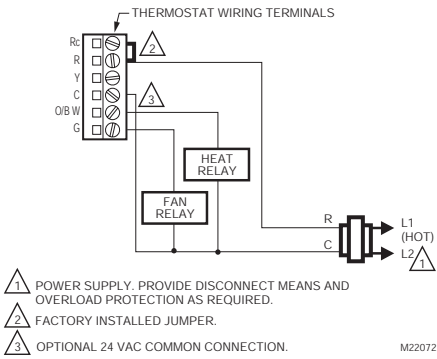


Fig. 10. Typical hookup of heat only system with fan.

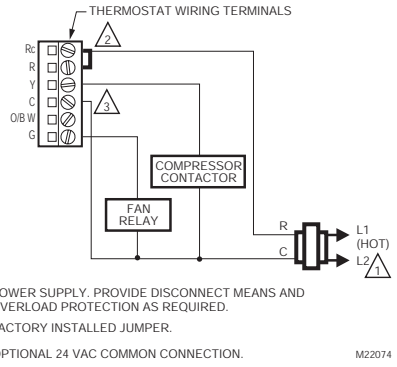


Fig. 12. Typical hookup of cool only system.

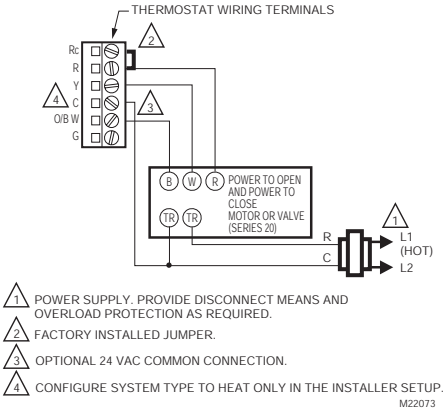


Fig. 11. Typical hookup of heat only Series 20 system.

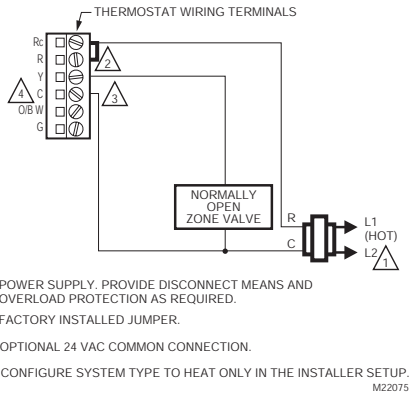


Fig. 13. Typical hookup of a heat only system with a normally open zone valve.

## POWER THE THERMOSTAT

You can choose from three methods to power the thermostat:

- Batteries only (AAA alkaline).
- 24 Vac common wire only.
- 24 Vac common wire with battery backup (AAA alkaline).

**NOTE:** Battery backup prevents blank displays during power interruptions.

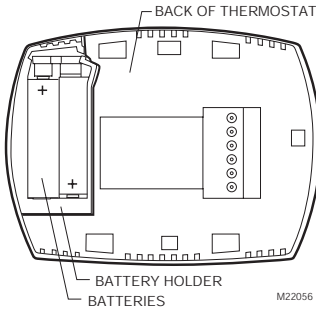
### Wiring 24 Vac Common

- **Single-Transformer System**—Connect the common side of the transformer to the C screw terminal of the thermostat wallplate. Leave the metal jumper in place between Rc and R.
- **Two-Transformer System**—Connect the common side of the cooling transformer to the C screw terminal of the thermostat wallplate. Remove the metal jumper between Rc and R.

### Installing Batteries

Install two AAA alkaline batteries on the back of the thermostat as marked on the battery holder. See Fig. 14.

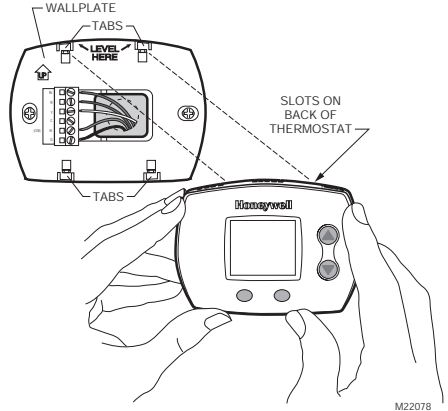
**NOTE:** After the thermostat is mounted on the wallplate, the thermostat does not require removal from the wallplate to replace the batteries. Refer to the enclosed Operating Instructions, 69-1713, for more information on the removable battery holder.



**Fig. 14. Installing batteries.**

### Mount Thermostat to Wallplate

1. Align the four tabs on the wallplate with the four slots on the back of the thermostat. Push the thermostat straight onto the wallplate until it snaps into place. See Fig 15.



**Fig. 15. Mount thermostat to wallplate.**

# INSTALLER SETUP

## Configure Installer Setup

1. Enter Installer Setup by pressing and holding the Up and Fan buttons, at the same time, for approximately five seconds, until the screen changes. See Fig. 16.

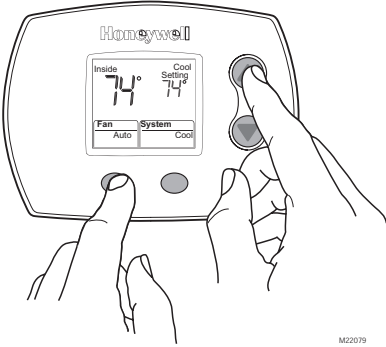


Fig. 16. Enter Installer setup.

2. Release the Up and Fan buttons when the display on the thermostat matches the display in Fig. 17.

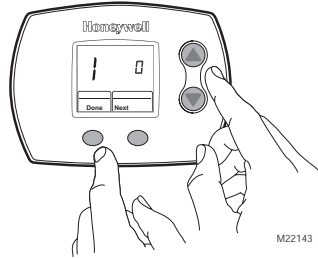


Fig. 17. Configure Installer Setup.

3. See Fig. 18 to review how the thermostat buttons are used during Installer Setup. See Table 3 for the Installer Setup Numbers and Settings.

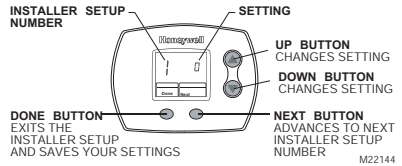


Fig. 18. Review thermostat buttons used for Installer Setup.

## Installer Setup Numbers and Settings

**Table 3. Installer setup numbers and settings.**

Installer Setup Number	Installer Setup Name	Settings
1	System Type	<b>0</b> —gas, oil or electric heat with air conditioning ( <b>Factory Setting</b> ) <b>1</b> —Heat pump <b>2</b> —Heat only (two-wire systems or power to open and power to close zone valves or normally-open zone valves) <b>3</b> —Heat only with fan <b>4</b> —Cool only
2 May not appear. See Note a	Changeover Valve-O/B Terminal Energized in Heating or Cooling (Heat Pumps only)	<b>0</b> —Changeover valve—O/B terminal energized in cooling ( <b>Factory Setting</b> ) <b>1</b> —Changeover valve—O/B terminal energized in heating
3 May not appear. See Note b	Fan Control in Heating	<b>0</b> — Gas or oil furnace— equipment controls fan in heating ( <b>Factory Setting</b> ) <b>1</b> — Electric furnace— thermostat controls fan in heating
5 May not appear. See Note c	Heating Cycle Rate in cycles per hour (cph)	<b>5</b> —5 cph used for gas or oil furnaces (less than 90% efficient) ( <b>Factory Setting</b> ) <b>1</b> —1 cph used for steam and gravity <b>3</b> —3 cph used for hot water and high efficiency furnaces (90%+) <b>9</b> —9 cph used for electric furnaces <b>2, 4, 6, 7, 8, 10, 11, 12</b> —Other cycle rate settings
9 May not appear. See Note d	Compressor Cycle Rate in cycles per hour (cph)	<b>3</b> —3 cph recommended for compressors ( <b>Factory Setting</b> ) <b>1, 2, 4, 5, 6</b> —Other cycle rate settings
12 May not appear. See Note e	System Setting Adjustment	<b>0</b> —Manual changeover ( <b>Factory Setting</b> ) (Heat, Off, Cool) <b>1</b> —Auto changeover (Heat, Off, Cool, Auto) <b>2</b> —Auto changeover only (Auto)
14	Temperature Display	<b>0</b> —Fahrenheit temperature display ( <b>Factory Setting</b> ) <b>1</b> —Celsius temperature display
15 May not appear. See Note f	Compressor Protection— Minimum-Off Timer in minutes	<b>5</b> —Five-minute compressor off-time setting ( <b>Factory Setting</b> ) <b>0, 1, 2, 3, 4</b> —Other compressor off-time settings
<p><b>Press the Next button to go to the beginning of the Installer Setup or press the Done button to exit the Installer Setup and save your settings.</b></p>		

### Installer Setup Notes:

- a**—Installer Setup Number 2 does not appear if Installer Setup Number 1 is set to 0, 2, 3 or 4.
- b**—Installer Setup Number 3 does not appear if Installer Setup Number 1 is set to 1, 2 or 4.
- c**—Installer Setup Number 5 does not appear if Installer Setup Number 1 is set to 1 or 4.
- d**—Installer Setup Number 9 does not appear if Installer Setup Number 1 is set to 2 or 3.
- e**—Installer Setup Number 12 does not appear if Installer Setup Number 1 is set to 2, 3 or 4.
- f**— Installer Setup Number 15 does not appear if Installer Setup Number 1 is set to 2 or 3.



# INSTALLER SYSTEM TEST

Use the Installer System Test to test the heating, cooling and fan.

## CAUTION

**Equipment Damage Hazard.**  
**Minimum compressor off time is bypassed during Installer System Test**  
 Avoid cycling compressor quickly.

### How to Use the Installer System Test

1. Enter the Installer System Test by pressing and holding down the Up and Down buttons at the same time for approximately five seconds, until the screen changes. See Fig. 19.

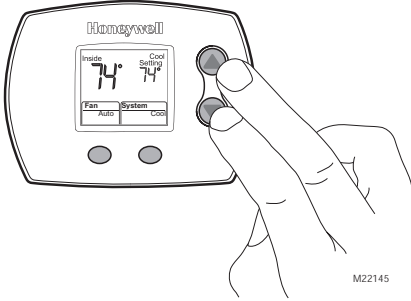


Fig. 19. Enter Installer System Test.

2. See Fig. 20 to review how the thermostat buttons are used during the Installer System Test. See Table 4 for available Installer System Tests.

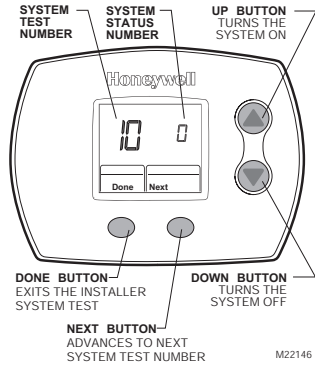


Fig. 20. Review thermostat buttons used during Installer System Test.

## Installer System Tests

### IMPORTANT

Use the Installer System Test to test the heating, cooling and fan. The setting you choose for System Type (Installer Setup Number 1) may prevent some System Test Numbers from appearing.

Table 4. Installer System Tests.

System Test Number	Test Type	System Status Number and Description
10	Heating System Test	1—Heat turns on. When Installer Setup Number 1 is set to 1 or Installer Setup Number 3 is set to 1, the fan turns on immediately. 0—Heat and fan turns off.
30	Cooling System Test	1—Compressor and fan turns on. 0—Compressor and fan turns off.
40	Fan System Test	1—Fan turns on. 0—Fan turns off.
70	Thermostat Information (For reference only)	71—Software revision number (Major) 72—Software revision number (Minor) 73—Configuration identification code (Major) 74—Configuration identification code (Minor) 75—Production configuration date code (Week) 76—Production configuration date code (Year)

Press the Next button to go to the beginning of the Installer System Test or press the Done button to exit the Installer System Test.

## THERMOSTAT OPERATION

### Thermostat Buttons and Battery Holder

See Fig. 21 for description of thermostat buttons and battery holder.

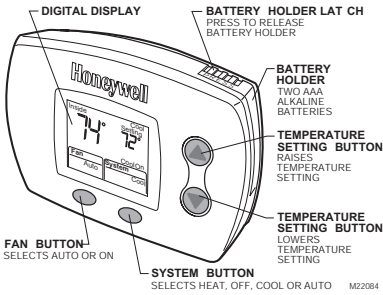


Fig. 21. Review thermostat button description.

### Display

See Fig. 22 for description of display.

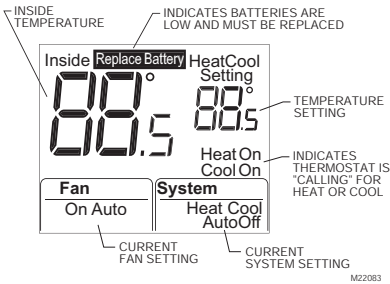


Fig. 22. Review display description.

### System and Fan Settings

#### System

**Heat**—Thermostat controls the heating system.  
**Off**—Both heating and cooling systems are off.  
**Cool**—Thermostat controls the cooling system.  
**Auto**—Thermostat automatically changes between heating and cooling operation, depending on indoor temperature.

#### Fan

**Auto** —Fan runs only when the heating or cooling system is on.  
**On**—Fan runs continuously.

### Minimum-Off Timer Compressor Protection

The TH5110 has an adjustable Minimum-Off Timer that can be set from zero to five minutes (Factory Setting—five minutes). The Minimum-Off Timer can be bypassed through the Installer System Test or it can be bypassed permanently by setting the Minimum-Off Timer to 0 minutes in the Installer Setup.

The Minimum-Off Timer is activated after the compressor turns off.

If the thermostat is system powered (common wire), the Minimum-Off Timer is also activated upon initial startup and after power interruptions.

If there is a call for cooling or heating during the Minimum-Off Time, the thermostat flashes "Cool On" or "Heat On"<sup>a</sup>. When the Minimum Off Timer expires, "Cool On" or "Heat On"<sup>a</sup> appears solid in the display and the compressor and fan turn on.

<sup>a</sup>Heat Pumps only.

### Accessories/Replacement Parts

1. Cover Plates (see Fig. 23):  
 50001137-001 (Small) Cover Plate—  
 4-5/16 in. (109 mm) high x  
 5-1/2 in. (140 mm) wide.

50002883-001 (Large) Cover Plate—  
 6 in. (152 mm) high x  
 8-5/16 in. (211 mm) wide.

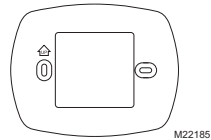


Fig. 23. Cover plate.

2. Replacement Battery Holder (see Fig. 24):  
 50000951-001 Battery Holder.

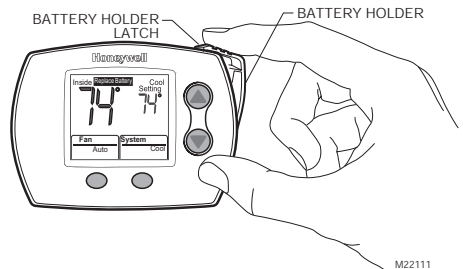


Fig. 24. Battery holder.

## TROUBLESHOOTING

Table 5. Troubleshooting

Symptom	Possible Cause	Action
Display is blank.	Thermostat is not powered.	Check for 24 Vac between Rc and C.  Check that fresh AAA alkaline batteries are installed as marked on the battery holder.
Temperature settings do not change.	The highest or lowest temperature setting was reached.	Temperature setting range: Heating: 40°F to 90°F (4.5°C to 32°C) Cooling: 50°F to 99°F (10°C to 37°C)
Heat does not turn on (Heat On is solid in the display).	Heating equipment failure.	Check for 24 Vac at the equipment on the secondary side of the transformer between power and common. If voltage is not present, check the heating equipment to find the cause of the problem.  Check for 24 Vac between the heat terminal (W) and transformer common. If 24 Vac is present, the thermostat is functional. Check the heating equipment to find the cause of the problem.
	Loose or broken wire connection between thermostat and heating equipment.	Check for 24 Vac between the heat terminal (W) and transformer common. If voltage is not present, check wire connection (loose or broken) between the thermostat and the heating equipment.
Cooling does not turn on (Cool On is solid in the display).	Cooling equipment failure.	Check for 24 Vac at the equipment on the secondary side of the transformer between power and common. If voltage is not present, check the cooling equipment to find the cause of the problem.  Check for 24 Vac between the cool terminal (Y) and transformer common. If 24 Vac is present, the thermostat is functional. Check the cooling equipment to find the cause of the problem.
	Loose or broken wire connection between thermostat and cooling equipment.	Check for 24 Vac between the cool terminal (Y) and transformer common. If voltage is not present, check the wire connection (loose or broken) between the thermostat and the cooling equipment.
Fan does not turn on in a call for heat (electric furnace).	Fan Control in Heating (Installer Setup Number 3) is set to Gas or Oil Furnace (Setting 0).	Set Fan Control in Heating (Installer Setup Number 3) to Electric Furnace (Setting 1).
Heat pump puts out cool air in the heat mode and warm air in the cool mode.	Changeover Valve (Installer Setup Number 2) is not configured to match the changeover required by the installed heat pump.	Set Changeover Valve (Installer Setup Number 2) to match the changeover required by the installed heat pump.
Both the heating and cooling equipment are running at the same time.	The heating equipment is not a heat pump but the System Type (Installer Setup Number 1) is set to Heat Pump (Setting 1).	Set System Type (Installer Setup Number 1) to match the installed heating and/or cooling equipment.
	Heating and cooling wires are shorted together.	Separate the shorted heating and cooling wires.

Table 5. Troubleshooting

Symptom	Possible Cause	Action
Heating equipment is running in the cool mode.	Heating equipment is not a heat pump but System Type (Installer Setup Number 1) is set to Heat Pump (Setting 1).	Set System Type (Installer Setup Number 1) to match the installed heating and/or cooling equipment.
Heating equipment does not turn off and the heat temperature setting is set below the room temperature (Heat On is not in the display).	Heating equipment is not a heat pump but System Type (Installer Setup Number 1) is set to Heat Pump (Setting 1).	Set System Type (Installer Setup Number 1) to match the installed heating and/or cooling equipment.
Cannot set the system setting to Heat.	System Type (Installer Setup Number 1) is set to Cool Only (Setting 4).	Set System Type (Installer Setup Number 1) to match the installed heating and/or cooling equipment.
	System Setting Adjustment (Installer Setup Number 12) is set to Auto Changeover Only (Setting 2).	Set System Setting Adjustment (Installer Setup Number 12) to Manual Changeover (Setting 0) or Auto Changeover (Setting 1).
Cannot set the system setting to Cool.	System Type (Installer Setup Number 1) is set to Heat Only (Setting 2) or Heat Only with Fan (Setting 3).	Set System Type (Installer Setup Number 1) to match the installed heating and/or cooling equipment.
	System Setting Adjustment (Installer Setup Number 12) is set to Auto Changeover Only (Setting 2).	Set System Setting Adjustment (Installer Setup Number 12) to Manual Changeover (Setting 0) or Auto Changeover (Setting 1).
Heat On is not in the display.	System setting is not set to Heat and/or the temperature setting is not set above the room temperature.	Set the system setting to Heat and set the temperature setting above the room temperature.
Cool On is not in the display.	System setting is not set to Cool and/or the temperature setting is not set below the room temperature.	Set the system setting to Cool and set the temperature setting below the room temperature.
Heat On is flashing in the display (Heat pumps only).	Compressor minimum off timer is active.	Wait up to five minutes for the heating equipment to turn on.
Cool On is flashing in the display.	Compressor minimum off timer is active.	Wait up to five minutes for the cooling equipment to turn on.

## SPECIFICATIONS

### Electrical Ratings:

Terminal	Voltage (50/60 Hz)	Running Current
W Heating	20 - 30 Vac	.02 - 1.0A
W Heating (Powerpile)	750 mV dc	100 mA dc
Y Cooling	20 - 30 Vac	.02 - 1.0A
G Fan	20 - 30 Vac	.02 - .60A

### Temperature Setting Range:

Heating: 40°F to 90°F (4.5°C to 32°C).

Cooling: 50°F to 99°F (10°C to 37°C).

**Operating Ambient Temperature:** 37°F to 102°F (2.8°C to 38.9°C).

**Shipping Temperature:** -30°F to 150°F (-34.4°C to 65.6°C).

**Operating Relative Humidity (Non-condensing):** 5% to 90%.

**Thermostat Dimensions:** 3-7/16 in (86 mm) high x 4-1/2 in. (114 mm) wide x 1-5/16 in. (33 mm) deep.

## Honeywell

### Automation and Control Solutions

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