



HEAT PUMP PROGRAMMABLE THERMOSTAT



Model 43168 Owners Manual

Heat Pump

Programmable Thermostat

Model 43168

Congratulations!

Thank you for choosing a Climate Technology Corporation (CTC) programmable thermostat. Your new CTC thermostat will provide years of reliable service and year-round energy savings.

Please read this manual before beginning installation and save this booklet for complete operation instructions.

The CTC Technical Support Group is available from 8 am to 5 pm EST M-F. They may be reached toll-free at 1-800-676-7861.

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IMPORTANT INFORMATION

1. This thermostat is designed to work on the following systems:

- Single-Stage Heat Pump
- Multistage Heat Pump (up to 2 heating and 2 cooling)

2. Temperature Range This thermostat can be set between 45°F and 95°F (7°C and 35°C). However, it will display room temperatures from 30°F to 99°F (0°C and 37°C). “HI” will be displayed if the temperature is higher than 99°F (37°C), and “LO” will be displayed if the temperature is lower than 30°F (0°C). This thermostat will automatically cutoff in Heat mode if the temperature rises above 95°F (35°C), and automatically cutoff in Cool mode if the temperature drops below 40°F (4°C).

3. Compressor Protection This thermostat provides a 3.5 minute delay after shutting off the system before it can be restarted. This feature will prevent damage to your compressor caused by rapid cycling.

INSTALLATION

What You Need

This thermostat includes two #8 slotted screws and two wall anchors for mounting. To install your thermostat, you should have the following tools and materials.

- Slotted screwdriver(s)
- Small Philips screwdriver
- Hammer
- Electric drill and 3/16” bit

Remove Old Thermostat

CAUTION: Do not remove any wiring from the existing thermostat before reading these instructions carefully. Wires must be labeled prior to removal.

IMPORTANT! Turn off the power to the HVAC system at the mainpower panel or at the HVAC system.

Remove existing thermostat cover and thermostat. See Figure 1. Some thermostats will have screws or other locking devices that must first be removed. Once the wall mounting plate is exposed, look for wires.

If wires are not visible, they may be connected to the back of the wallplate. Again, look for screws, tabs, etc. Some models have doors that open to expose wires and mounting screws. See Figure 1.

Typical Home Thermostats

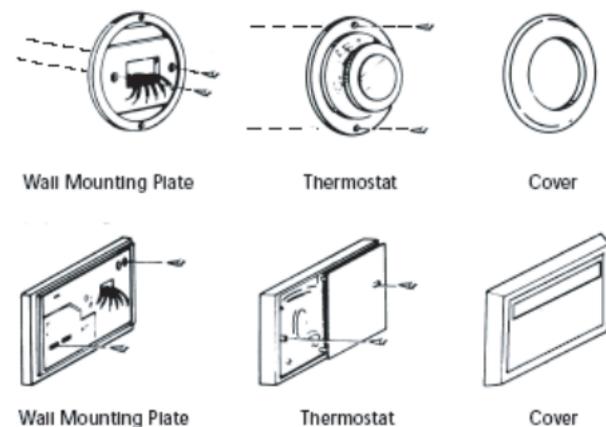


Figure 1

Wire Labeling

- **CAUTION!** TURN OFF POWER TO THE HEAT PUMP SYSTEM BEFORE YOU ATTEMPT TO ACCESS THE THERMOSTAT'S WIRING.
- **IMPORTANT!** BEFORE DISCONNECTING ANY WIRES FROM THE EXISTING THERMOSTAT, APPLY THE PROVIDED SELF-ADHESIVE LABELS TO THE WIRES.
- Use the information in Table 1 below and the provided adhesive labels to label the wires. IGNORE THE COLOR OF THE WIRES since these do not always comply with the standard.

<i>If the terminal letter on the existing thermostat is. . .</i>	<i>. . .then mark the wire with adhesive label</i>
R, V-VR, or VR-R	R
Y, Y1, or M	Y1
Y2	Y2
W1, W2, or W-U	W2
E	E
G or F	G
O or R	O
B	B
L or X	L
C, X, or B	C (Required)

Table 1

- After labeling the wires, disconnect them from the existing thermostat terminals.
- Remove existing wallplate. To make sure wires do not fall back into wall opening, you may want to secure them to the wall.
- If the hole in wall is larger than necessary for wires, seal the hole with insulating material so that no hot or cold air can enter the back of the thermostat from the wall. This air could cause a false thermostat reading.
- A wiring diagram is provided on page 40 of these instructions.

Mount Wallplate

- Remove the wallplate from the thermostat by pressing the release tab on the bottom of the thermostat. See Figure 2.



Figure 2

- Position wallplate on wall and pull existing wires through the large opening, then level for appearance. If the existing mounting holes from the old wallplate line up with the slots in the new wallplate, then use the existing holes. If the existing holes do not line up with the slots in your new wallplate, then mark the wall for holes for the provided plastic anchors.
- Drill holes with 3/16" bit and gently tap anchors into the holes

Connect Wires and Mount Thermostat to Wallplate

- Match and connect the labeled wires to the appropriate coded terminal screws on the wallplate. See Figure 4. Ignore any wires which may be present, but which were not connected to the old thermostat.

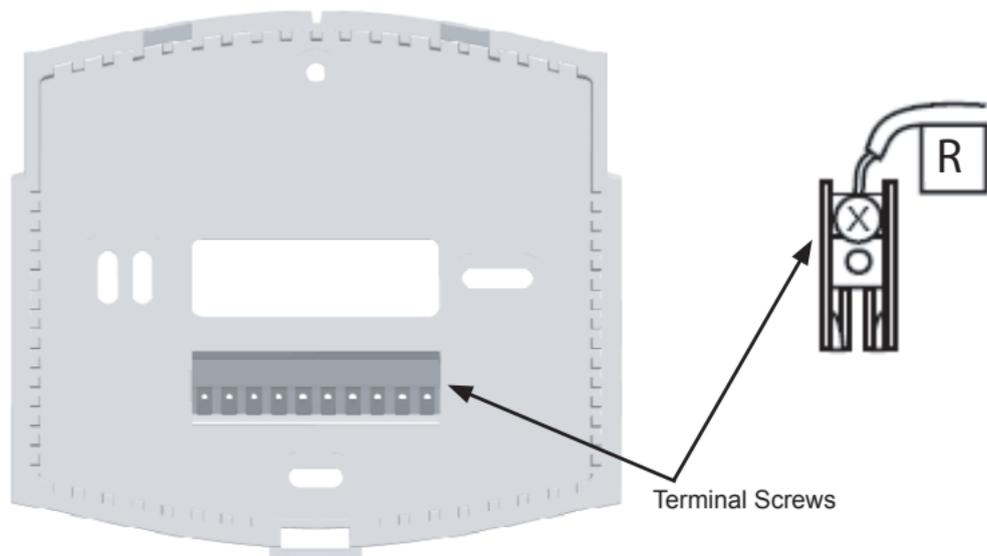


Figure 4

- Be sure to tighten the terminal screws securely, as a loose wire could cause operational problems with your system or thermostat.
- Push excess wire back into the hole to prevent interference when installing the thermostat to the wallplate.
- Set the System Switch to "off", and the Fan Switch to "auto".

- On the back of the thermostat are the System Set-Up Switches. See Figure 5. (NOTE: For clarity, the illustration of the thermostat circuit board omits most of the circuit board components to clearly show the System Set-Up Switches.) If the heat pump system has an electric auxiliary system, then slide the #1 switch to HE position. If the heat pump system has a gas auxiliary system, then slide the #1 switch to the HG position.

To set up the LCD display to show the temperature in Fahrenheit, slide the #2 switch to the F position. To set up the LCD display to show the temperature in Celsius, then slide the #2 switch to the C position.

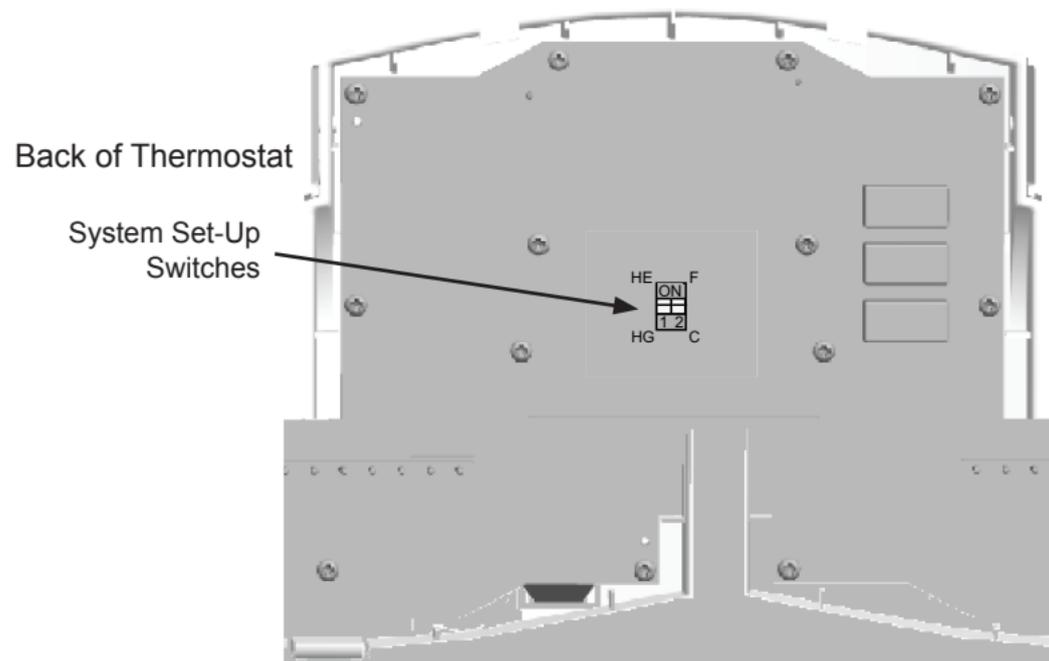


Figure 5

- Insert the tabs on top of the thermostat body into the slots at the top of the wallplate. Press the bottom of the thermostat body into the snap on the bottom of the wallplate. (**NOTE:** Do not force the thermostat onto the wallplate, as the terminal pins may be damaged. If it does not snap properly, the thermostat may not work.)
- Turn on power to the heat pump system.
- If the wiring to the thermostat has been correctly connected, and if the thermostat has been correctly mounted to the wallplate, then the LCD Display should show the indoor room temperature.

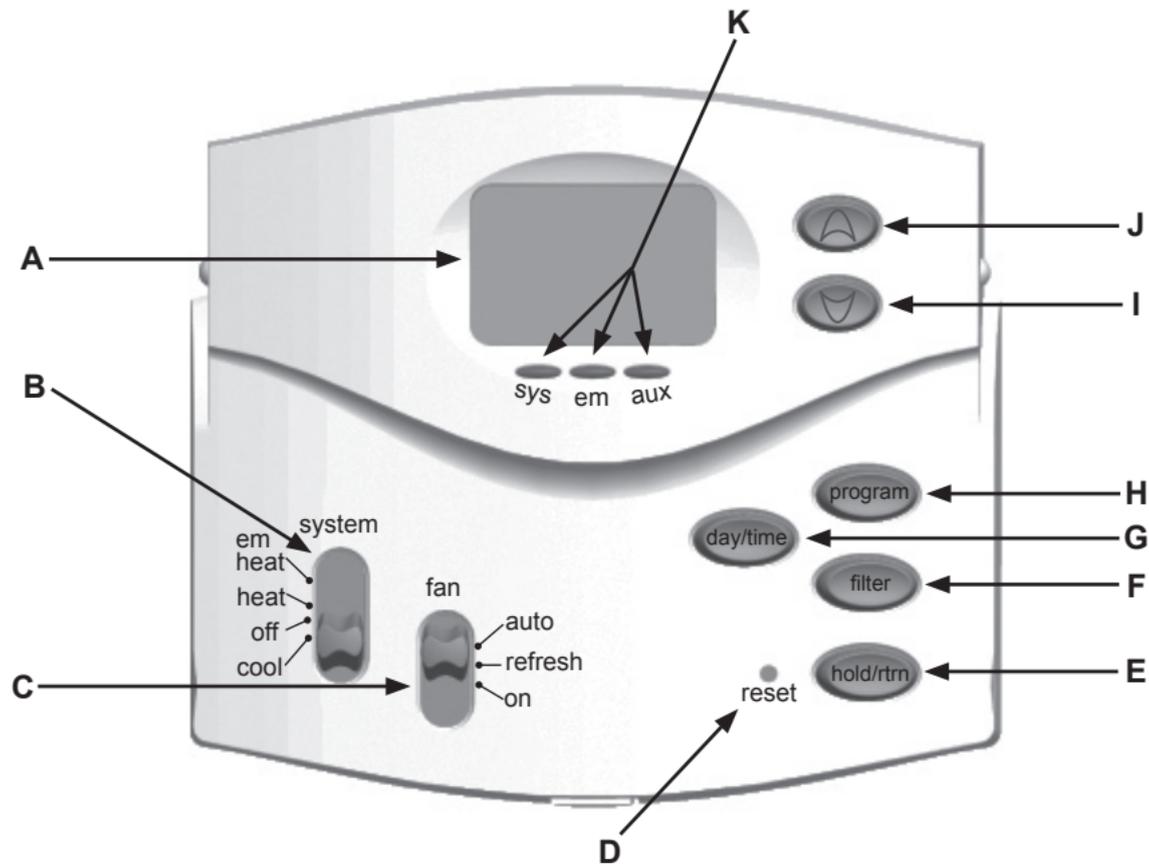
THERMOSTAT CONTROLS

- Open the thermostat's front cover. See Figure 6.



Figure 6

Switches and Buttons



Switches and Buttons

A LCD Readout - displays indoor temperature, set temperature, and information about the heat pump system's operation and status.

B System Switch - "em heat" is the Emergency Heat. NOTE: The Emergency Heat Mode is not an energy saving mode, so use it only when necessary. "heat" is the normal heat mode. "off" turns the system off. "cool" is the normal cooling mode.

C Fan Switch - In Auto mode, the fan runs when the system is on for heating or cooling. The Refresh mode sets the fan to run automatically at intervals of 10, 15, 20, or 30 minutes out of every hour when the system is not running for heating or cooling. In the On mode, the fan runs continuously regardless of system status.

D Reset button - push the Reset button with the end of a paper clip to reset the thermostat and return to its factory default settings.

E Hold/Return button - used for setting a permanent (vacation) hold, and for returning to the normal display from Day & Time setting, Programming, or Option setting modes.

F Filter button - reviews and resets the thermostat's Filter Life Counter.

G Day/Time button - used for entering the Clock Setting mode. Use with the Up and Down buttons to set the time and day.

H Program button - used for entering and modifying programs. Use with the Up and Down buttons to set times and temperatures. Press when in clock mode to select between 12-hour and 24-hour clock modes.

I Down button - used to change the temperature setting and the option settings.

J Up button - used to change the temperature setting and the option settings.

K System LED's - for heat pump systems that have fault detection capabilities, the "sys" LED glows red when the thermostat has detected a fault through the L terminal connection from the heat pump. The "em" LED glows red when Emergency Heat is turned on. The "aux" LED glows green when the auxiliary heat is turned on.



Settings

The default for this thermostat setting is in a 12 hour format. You can change the format to 24 hour format by pressing **DAY/TIME** and then **PROGRAM**.

The AM/PM indicator will be off when the thermostat is in 24 hour mode.

Setting day and time:

1. Press **DAY/TIME**. (AM/PM and current hour will flash)
Press **UP** or **DOWN** to adjust the setting.
2. Press **DAY/TIME** again to adjust the minute setting.
Press **UP** or **DOWN** to adjust the setting.
3. Press **DAY/TIME** again to adjust the day of the week.
Press **UP** or **DOWN** to adjust the setting.
4. Press **DAY/TIME** to return to the normal display.
Press **UP** or **DOWN** to adjust the setting.

You may also press **HOLD/RETURN** at any time to return to the normal display.



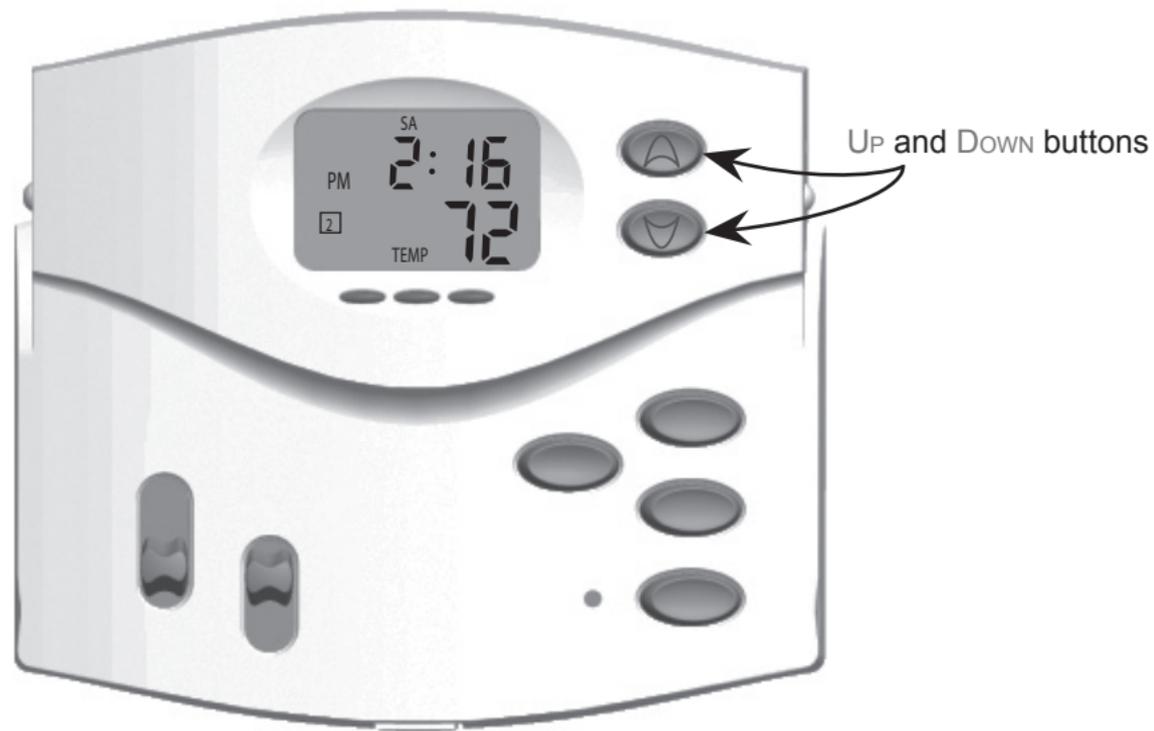
Methods of Operation

This thermostat gives you the ability to program up to 4 custom temperature settings per day or utilize pre-programmed settings.

For manual operation instructions, see pages 21-23.

To utilize the pre-programmed settings, see pages 24-25.

To create custom programs, see pages 26-29.



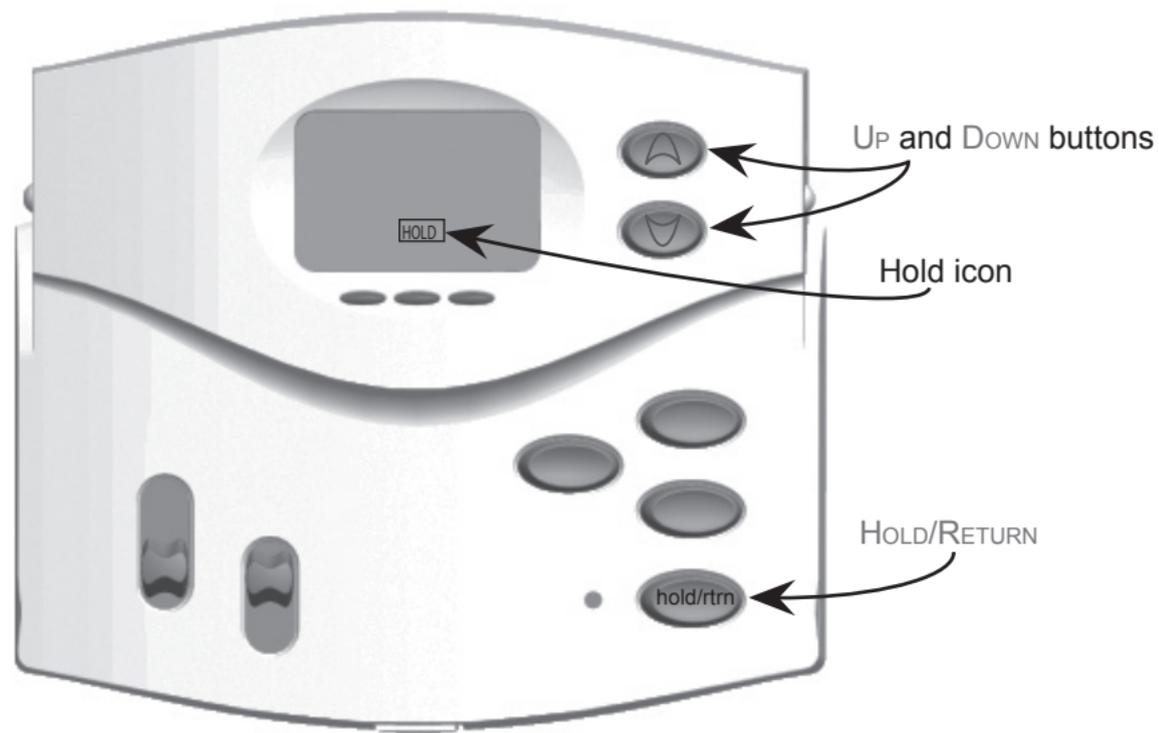
Methods of Operation (cont.)

1. MANUAL OPERATION

Many people prefer to operate their thermostats manually, adjusting settings as needed. You can either temporarily override the settings for the current program, or permanently override all settings and adjust temperatures manually.

If you want to only temporarily override the current program:

1. Press and hold UP or DOWN for one second to enter Manual Override mode. (Release the button when the display flashes.)
2. Press the UP or DOWN buttons to adjust the temperature setting as desired.
3. The thermostat will maintain this setting until the next program starts, or 4 hours maximum.



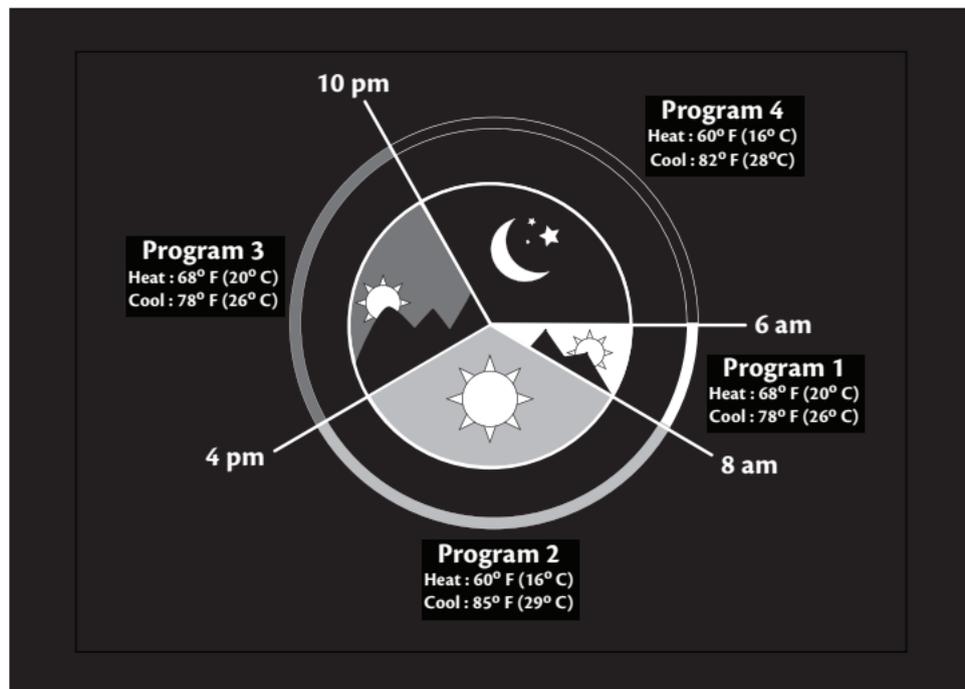
Methods of Operation (cont.)

MANUAL OPERATION, CONT.

If you want to permanently override all settings and adjust the thermostat manually:

1. Press **HOLD/RETURN** until the Hold icon appears.
2. Press and hold **UP** or **DOWN** for one second to enter Manual Override mode. (Release the button when the display flashes.)
3. Press the **UP** or **DOWN** buttons to adjust the temperature setting as desired.
4. Press and release **HOLD/RETURN** to return to the normal display.

DEFAULT PROGRAMS CHART

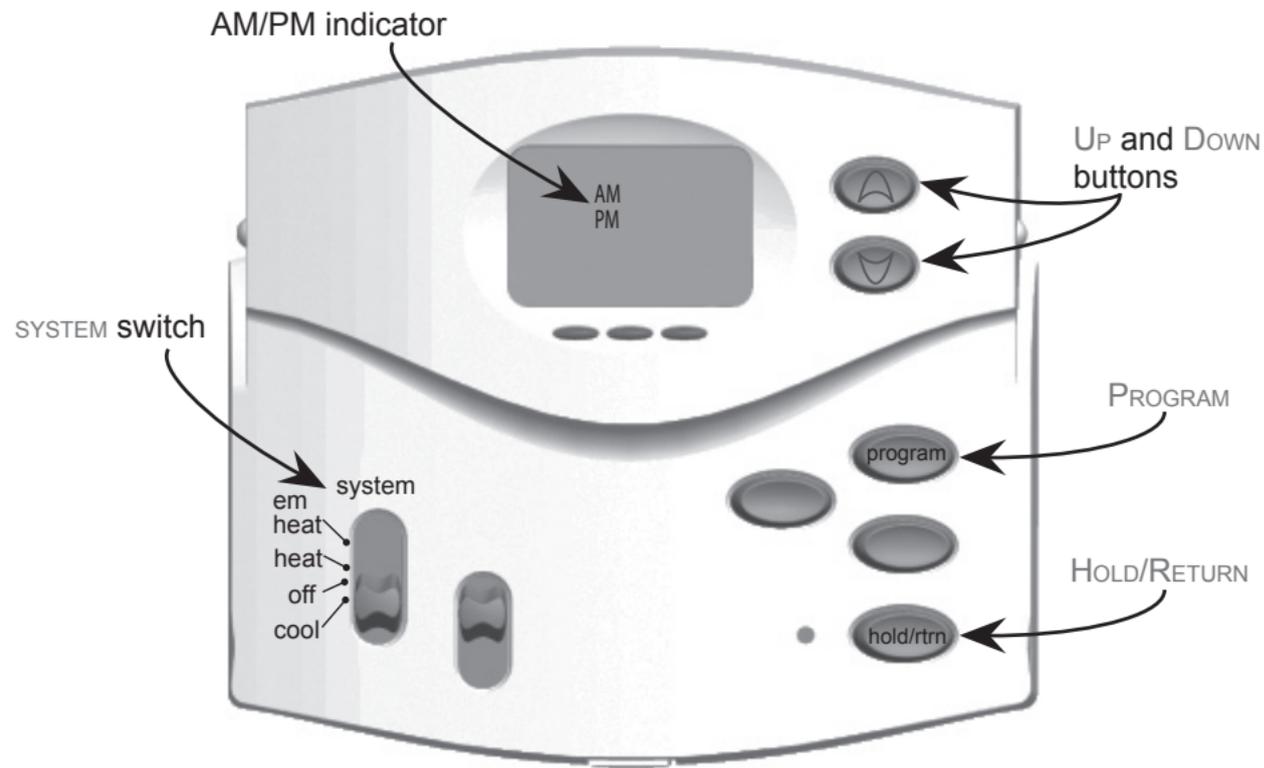


Methods of Operation (cont.)

2. DEFAULT PROGRAMS

This thermostat meets ENERGY STAR guidelines for energy efficiency. By using the pre-programmed settings, this thermostat can save you money by optimizing energy usage in heating and cooling.

Refer to the Default Programs Chart on page 24 for detailed information about the pre-programmed settings.



Methods of Operation (cont.)

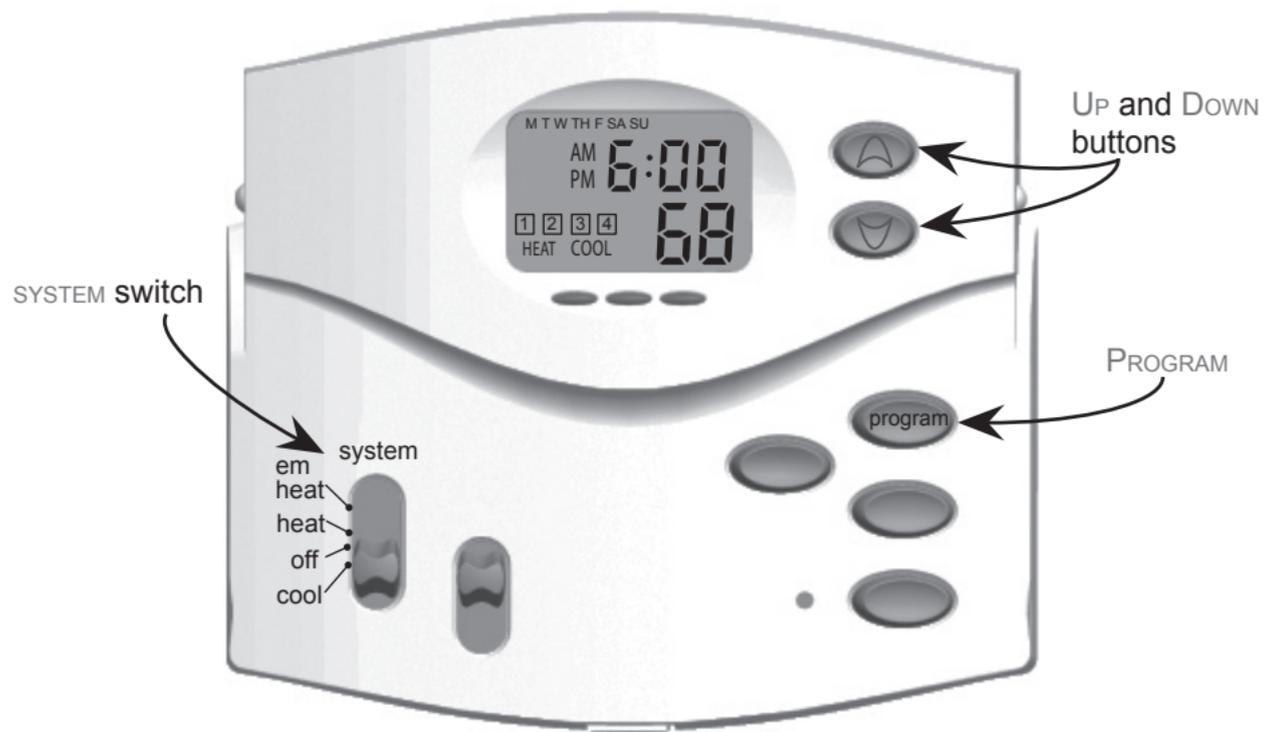
3. CREATING CUSTOM PROGRAMS

NOTES:

- Program times can be set in 10 minute increments.
- Program temperature can be set in increments of 1^o F (1^o C).
- After 15 seconds of inactivity during programming, the thermostat will return to Normal Display mode.
- When setting each program time, note the AM/PM indicator.
- Press HOLD/RETURN at any time to exit Program mode.

PROCEDURE:

1. Slide the SYSTEM switch to HEAT or COOL to program the corresponding system.
2. Press PROGRAM to enter Program mode. (The LCD will begin to flash.)



Methods of Operation (cont.)

3. Press **UP** or **DOWN** to change the hour. Press **PROGRAM** to save the hour and adjust the minute setting.
4. Press **UP** or **DOWN** to change the minute. Press **PROGRAM** to save the minute setting and adjust the temperature.
5. Press **UP** or **DOWN** to change the temperature. Press **PROGRAM** again to move to the next program number.

NOTE: There are 4 programs per day. If you do not wish to assign 4 programs per day, then set the unused program time to same setting as the program(s) you did set, keeping in mind that the total program time must equal 24 hours.

6. Repeat steps 2-5 for the remaining days.
7. To review your program settings, press **PROGRAM** repeatedly to review the customized programs.
(You can make changes at any time when the thermostat is in Program mode.)
8. Slide the **SYSTEM** switch to the opposite position and repeat steps 2-5.



Icons and Features

1. INDIGLO[®] night-light - will backlight the display for easy viewing in the dark. Press any button to illuminate the light.
2. Filter change indicator - will flash after 400 hours of system use as a reminder to check or change your filter. Press and hold the **FILTER** button for 5 seconds after changing the filter to reset the filter timer.

(Pressing the Filter button for less than 5 seconds will cause the Filter change indicator icon to appear. The filter timer will not be affected unless the button is held for more than 5 seconds.)

5. Auto recovery – allows heating and cooling systems to gradually recover from an energy-saving setpoint temperature to a comfort setpoint temperature. Auto recovery calculates the time needed to adjust the temperature to the next program setting. When the thermostat is in Auto Recovery mode, the display will flash alternating messages of RECO and the time. Auto Recovery can be disabled by sliding the recovery switch on the back of the circuit board to the disable position.

(Auto Recovery will not operate if Permanent or Temporary holds are on.)

Press **HOLD/RETURN** during the Auto Recovery process to manually cancel the recovery.



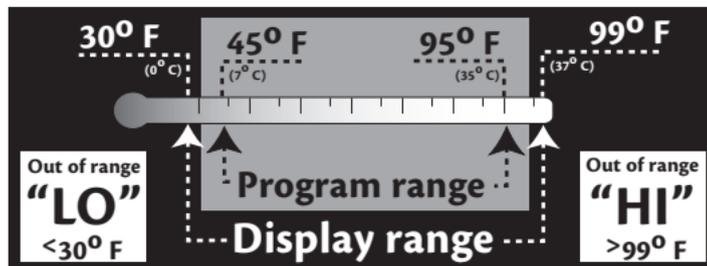
Icons and Features (cont.)

6. Error mode – if the thermostat is unable to control your system due to an unexpected problem, the thermostat will enter Error Mode. In this condition, the thermostat flashes “E1”, “E2”, or “E3” on the LCD display, and shuts off your system.
7. Auto cut off – automatically turns the system off if the temperature rises above 95^o F (35^o C) or drops below 40^o F (4^o C).

(If your HVAC system has malfunctioned, the system will no longer respond to thermostat controls and the Auto cut off will have no effect.)
8. Your CTC thermostat also has "Freeze Protection". When the temperature drops to below 40^o F, the thermostat will automatically turn on the heat to maintain 40^o F.

Important Features

1. Temperature Range



2. Compressor Protection

After the system stops running, there will be a 3.5 minute delay before it can be restarted to prevent compressor damage due to rapid cycling.



3. Resetting the unit

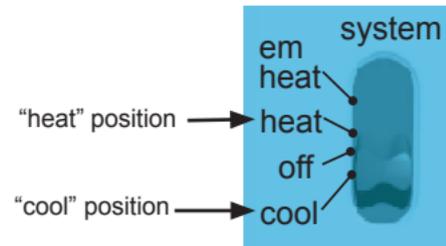
To restore the thermostat to the original factory settings, press the reset button with a paperclip. (This will erase any user-programmed settings.)



OPERATION

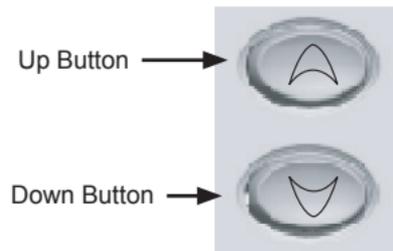
Review the Set Temperature

1. Slide the "system" switch to either the "heat" position or the "cool" position.
2. Press either the Up or Down button for less than one second. The LCD Display will show "set temp" and the set temperature.



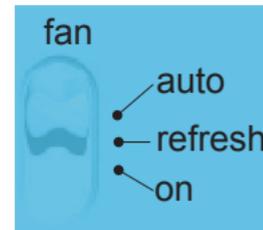
Change the Set Temperature

1. Press and hold either the Up or Down button for more than one second. The LCD Display will show "set temp", the set temperature.
2. To raise the Set Temperature, press the Up button. To lower the Set Temperature, press the Down Button.



Heating or Cooling

1. To set the system for Heating, slide the "system" switch to "heat". To set the system for Cooling, slide the "system" switch to "cool".
2. Slide the "fan" switch to "auto", "refresh", or "on". See page 36 for an explanation of the Refresh feature.



Setting Options

The following Options are available on your thermostat:

1. 1st stage span - The factory setting for Stage 1 heating and cooling is 1, meaning that your thermostat will cycle at 1°F (0.5°C) above and below the set temperature in Stage 1. If the system is cycling too fast or too slow, then the Span can be adjusted to change the cycle time. To change the 1st Stage span, see #1, below.
2. 2nd stage span - The second or auxiliary stage turns on when the first stage does not have enough capacity to reach the set temperature. The factory setting for 2nd Stage span is 2 (3°F, 1.5°C). To change the 2nd Stage span, see page 37.
3. The Residual Cooling Fan Delay Setting - Sets the fan to run for 0, 30, 60, or 90 seconds after the compressor turns off in the cooling mode. The default setting is 30 seconds. To change the Residual Cooling Fan Delay Setting, see page 37.
4. The Refresh Cycle Time - Sets the fan to run automatically at intervals of 10, 15, 20, or 30 minutes to circulate air when the system is not running for heating or cooling. The default setting is 15 minutes. To change the Refresh Cycle Time, see page 37.
5. Auto Recovery - allows heating and cooling systems to gradually recover from an energy-saving setpoint temperature to a comfort setpoint temperature. Auto Recovery calculates the time needed to adjust the temperature to the next program setting. When the thermostat is in Auto Recovery mode, the display will flash alternating messages of "RECO" and the time. To set Auto Recovery either On or Off, see page 37.

To access the Option Mode and set the Span setting of the 1st stage:

1. Press the Up and Down buttons at the same time and hold them for three seconds. The LCD Display will show "sta 1" and the 1st stage Span setting, either 1 (factory setting), 2, or 3, meaning that the Span setting is at 1°F (0.5°C), 2°F (1°C), or 3°F (1.5°C).
2. Press the Up button to increase the 1st stage Span setting, which will cause your system to run longer. Press the Down button to decrease the 1st stage Span setting, which will cause your system to run shorter.

To set the Span setting of the 2nd stage:

1. Press Program after you finish setting the Stage 1 span. The LCD Display will show "STA 2" and the 2nd stage Span setting, either 1, 2 (factory setting), 3, 4, or 5, meaning that the Span setting is at 2°F (1°C), 3°F (1.5°C), 4°F (2°C), 5°F (2.5°C), or 6°F (3°C).
2. Press the Up button to increase the 2nd stage Span setting. Press the Down button to decrease the 2nd stage Span setting.

To set the Residual Cooling Fan Delay:

1. Enter the "Option Mode".
2. Press "Program" until the display shows "RCFD".
3. Press the UP button to increase the Delay time.
4. Press the DOWN button to decrease the Delay time.

To set the Refresh Fan Cycle Time:

1. Enter the "Option Mode".
2. Press "Program" until the display shows "FAN".
3. Press the UP button to increase the Cycle time.
4. Press the DOWN button to decrease the Cycle time.

To set Auto Recovery on or off:

1. Enter the "Option Mode".
2. Press "Program" until the display shows "RECO".
3. Press the UP button or the DOWN button to turn Auto Recovery on or off.

Filter Reminder

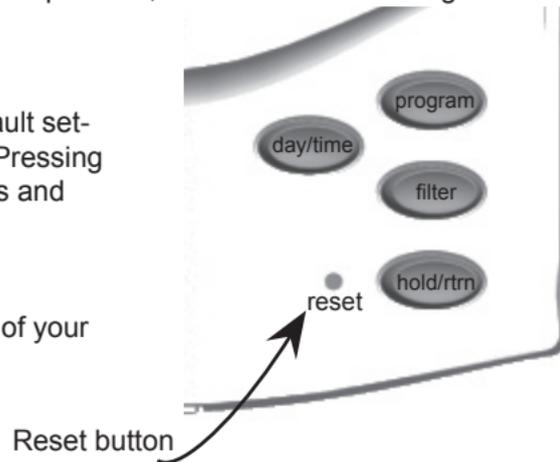
The LCD Display will show “filter” after every 400 hours of fan operation, as a reminder to change the HVAC system’s filter as soon as possible.

Resetting Your Thermostat

Should you desire the thermostat’s factory settings and default settings, use the tip of a paper clip to press the “reset” button. Pressing the Reset button reverts the thermostat to its factory settings and default settings.

Power Outage

In the event of a power outage, the thermostat will retain all of your current settings.



TROUBLESHOOTING

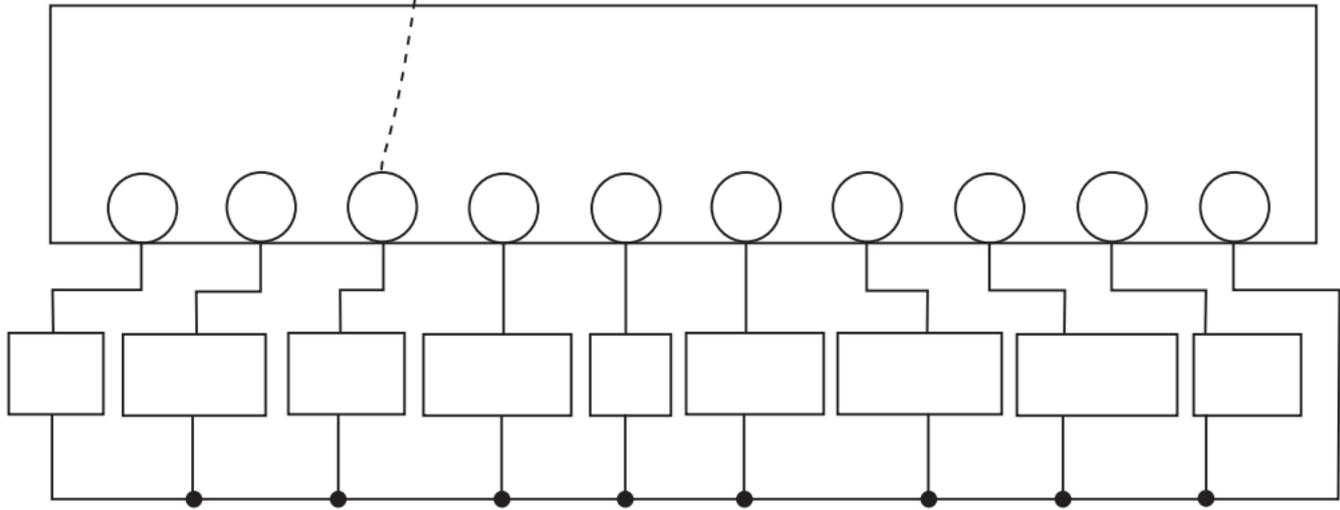
Problem	Solution
LCD Display is blank	<ol style="list-style-type: none">1. Check wiring connections. A Common (C) wire is required for operation.2. Press and hold the Reset button for two seconds with the tip of a paper clip.
Auto/Fan does not turn on in Heat Mode	<ol style="list-style-type: none">1. Move the #1 System Set-Up Switch (HG/HE) to the opposite position.
Erratic display	<ol style="list-style-type: none">1. Press and hold the Reset button for two seconds with the tip of a paper clip. The thermostat will need to be re-programmed.

TROUBLESHOOTING

Problem	Solution
Fan runs continuously	<ol style="list-style-type: none">1. Check the Fan Switch. The fan will run continuously if the Fan switch is in the “on” position.
Heating or cooling does not go on or off	<ol style="list-style-type: none">1. Ensure the System Switch is in the desired position (“heat”, “cool”, “em heat”).2. There may be as much as a 4 minute Compressor protection delay before the Heat or Cool system turns on - wait and check.3. Check your circuit breakers and switches to ensure there is power to the system.4. Make sure your furnace blower door is closed properly.
System continues to operate in the Off position.	<ol style="list-style-type: none">1. Replace thermostat.2. Make certain the thermostat is wired correctly and that none of the wires are touching other wires.
Thermostat permanently reads “E1”, “E2”, or “E3” after pressing the Reset button.	<ol style="list-style-type: none">1. Replace thermostat.

If you experience any other problems with your CTC thermostat, call CTC Technical Support at 1-800-676-7861 from 8am to 5pm Central Time.

WIRING DIAGRAM



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