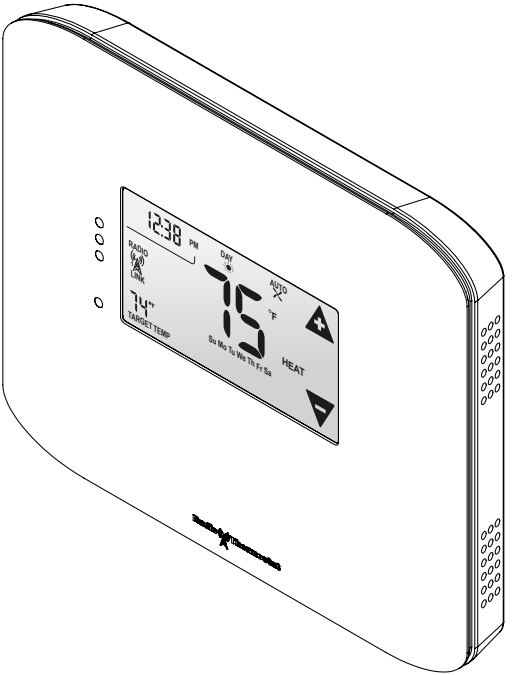
CT100 PLUS USER GUIDE

COMMUNICATING TOUCH SCREEN THERMOSTAT



Radio Thermostat

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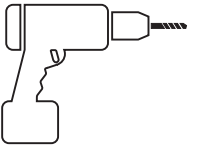
Getting Started

Tools Needed

Small Phillips screwdriver

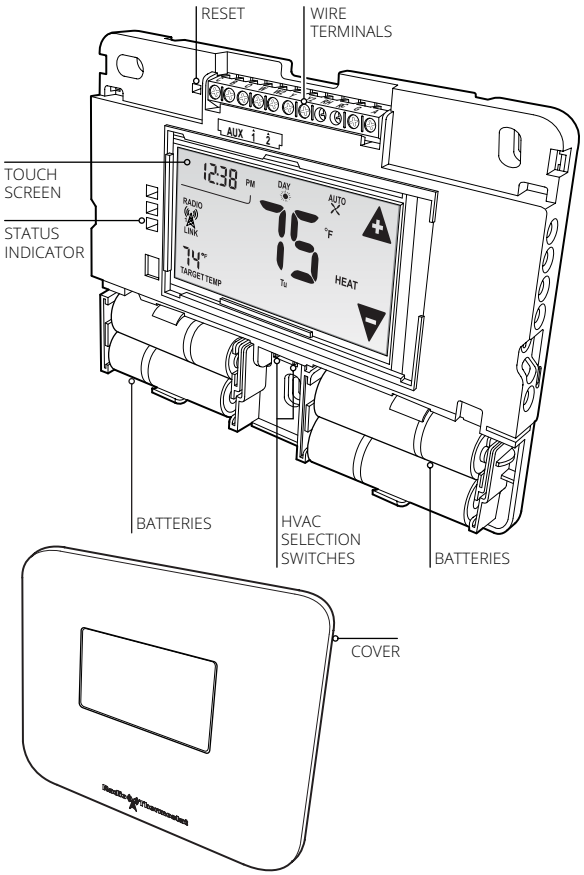
Drill with 3/16-in.(4.8mm) bit



⚠ CAUTION

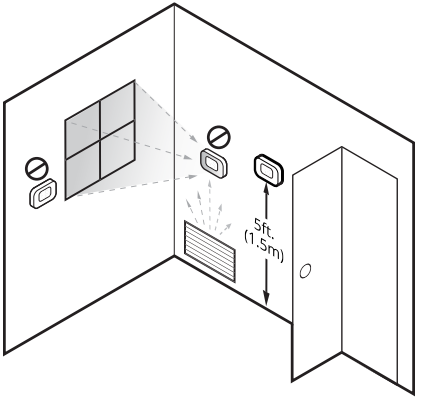
- To avoid electrical shock and to prevent damage to the furnace, air conditioner, and thermostat, disconnect the power supply before installing or servicing the thermostat or any part of the system. This can be done at the circuit breaker.
- Do not reconnect electricity until work is complete.
- Do not short (jumper) across electric terminals at the control on the furnace or air conditioner to test the system. This can damage the thermostat.
- Your thermostat is a precise instrument. Handle it with care.
- All wiring must conform to local codes and ordinances.
- This thermostat is designed for use with 4AA alkaline batteries and/or 24-volt AC C wire (or a 12-24 AC or DC source) and millivolt gas systems. Each thermostat relay load should be limited to 1.0 amp; higher amperage can cause damage to the thermostat.

Interior View



Installation Location

To avoid having to move your wiring to a new location, mount the CT100 in place of the old thermostat.



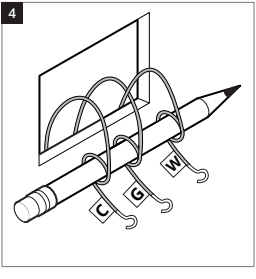
- Install the thermostat on an inside wall of an often-used room, about 5 ft. (1.5m) above the floor.
- Do not install where there are unusual heating conditions, such as: in direct sunlight; near a lamp, radio, television, radiator register, fireplace; near hot water pipes in the wall; or near a stove on the other side of a wall.
- Do not locate in unusual cooling conditions, such as: on a wall separating an unheated room; or in a draft from a stairwell, door, or window.
- Do not locate in a damp area. This can lead to corrosion that will shorten the thermostat's life.
- Do not locate where air circulation is poor, such as: a corner, an alcove, or behind an open door.
- Do not install the CT100 until all construction and painting is complete.
- This thermostat does not require leveling.

⚠ CAUTION

- Read instructions carefully before removing any wiring from an existing thermostat.
- Label all wires before disconnecting them form the existing thermostat.

1. Switch off electricity to the heating and cooling systems. This can be done at the circuit breaker.
2. Remove the cover from the existing thermostat. Check for locking screws on the side or front that must be loosened first.
3. Attach provided labels to each wire for identification. Refer to the lettered terminal where the wires attach; do not use the color of the wires.
4. Disconnect wires from the existing thermostat, and wind them around a pencil to keep them from falling back inside the wall.
5. Loosen all mounting screws on the old thermostat and remove it from the wall.

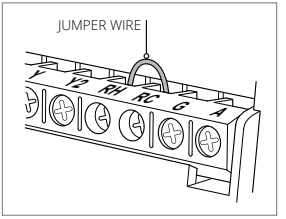
4

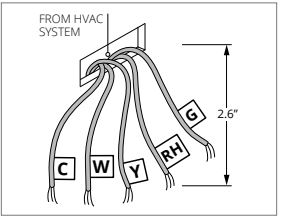


Prepare Wires

Make sure your wires are labeled. If necessary, find the "other end" connection for each wire on your heating or air conditioning equipment and note the label there.

1. Fan out wires so that they are aligned with their terminals.
2. Position wires behind the CT100 and over the terminal area.
3. Do not bunch wires behind the CT100. Feed any slack back into the wall opening.





If you have both RH and RC connections you must remove the jumper wire between these two terminals.

⚠ CAUTION

Do not allow wires to touch each other or other parts on the thermostat.

Follow these guidelines for safe and secure wire connections:

- Use at least 2.6 in. of wire for each of your connections to the CT100.
- If you do not have enough wire, splice additional wire to allow enough slack.
- Terminals accept wires from 16-22 awg.
- Remove 1/8 in. insulation from the tip of each wire.
- Take care not to damage the labels for each wire.

Connecting Your Wires

Reference the Detailed Wire Diagram on page 18 to identify your wiring diagram and set-up information. If necessary, contact customer support for help.

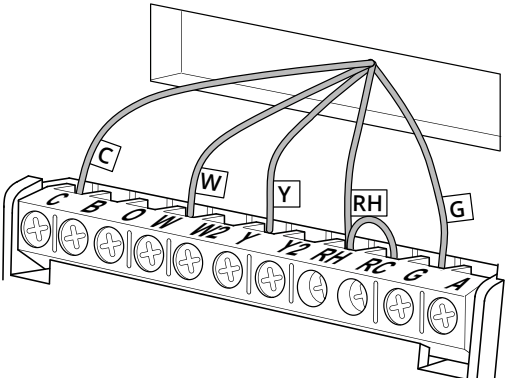
1. Connect a labeled wire only to a matching lettered terminal.
2. Insert the wire in the terminal well and tighten the screw securely.

The CT100 can be externally powered with a power source rated from 12V to 24V, AC or DC, at 300ma or greater. If used, connect to the C and RH terminals (no polarity).

The 24VAC "C" wire is the other side of the 24VAC heating transformer and can be found where the other thermostat wires connect at the wall or at the furnace. Do not use the common or ground side of the line voltage.

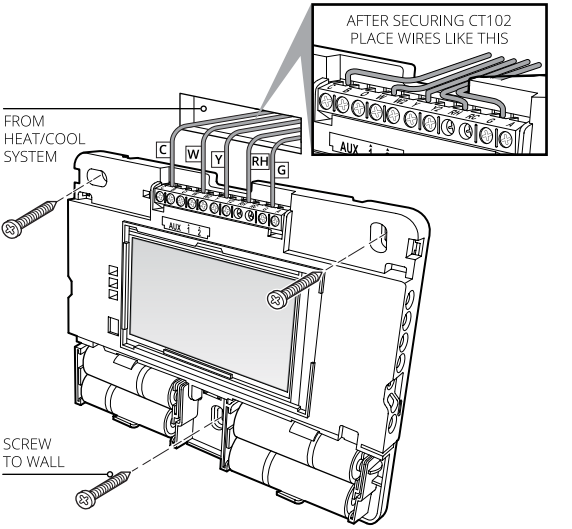
The CT100 runs on 4 AA alkaline batteries, the C wire (if available), or both batteries and the C-wire. If you do not have a C wire, you can run a new wire from the HVAC or use a standard 12-24V [AC or DC] wall transformer.

The C-wire is optional but preferred for all installations.



Mount the CT100 to the Wall

1. Hold the CT100 against the wall, with the wires coming over the top; above terminal block.
2. Position CT100 for best appearance, cover the hole in the wall.
3. Mark first and drill a 3/16-in.(4.8mm) hole at each screw location.
4. If you are mounting the CT100 to sheet rock or if you are using the old mounting holes, use the plastic anchors provided.
5. Attach the CT100 to the wall with the screws provided.



Setup

Selecting HVAC & Heat Types

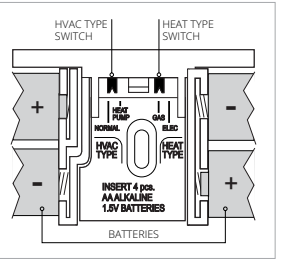
Both switches are located in the battery compartment.

1. Set HVAC TYPE to the type of heating and cooling system.

Norm	**Heat Pump**
All other systems	Heat Pump system with or without Auxiliary Heat

2. Set the HEAT TYPE to the type of fuel used for heating. If HVAC Type is Heat Pump, then select fuel used for Auxiliary.

Gas	**Elec**
natural gas, oil, and propane	electric

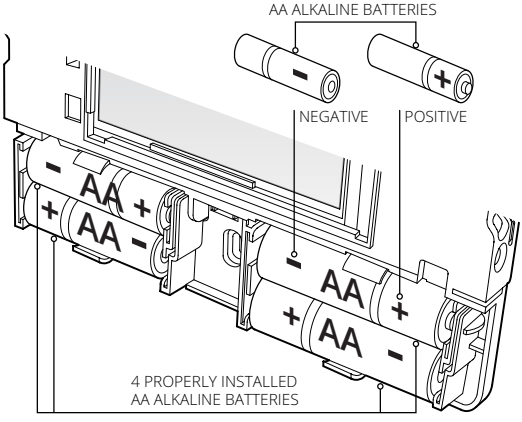


Power Supply

While the CT100 Thermostat can run without batteries on C-wire power, you should install batteries as well to provide power to the unit during outages.

1. Install four (4) AA alkaline batteries following the marked polarity in the battery compartments. Insert the battery negative end first against the spring, then push the positive end in.
2. With all the wires connected and the unit attached to the wall, it is time to turn the AC power back on. Reconnect the power at the breaker you used to switch it off. The CT100 will power-up in the OFF mode.
3. Trip the RESET button to implement the HVAC switch selections.
4. Your CT100 is not yet configured to operate your HVAC system. You must now configure your thermostat (see page 15.)

Battery Installation



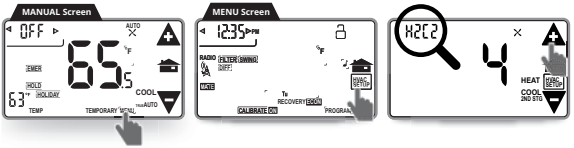
⚠ THERMOSTAT BATTERY CAUTIONS

- Always use new Alkaline batteries.
- Do not use rechargeable batteries of any type. They will no operate the thermostat properly and may lead to damage.
- Do not mix old and new batteries.
- Do not mix battery types, for example Lithium with Alkaline.
- Do not dispose of batteries in fire. Batteries may explode or leak.
- Always replace the batteries as soon as the "Low Batt" warning flashes. The thermostat is a battery-powered device; you should replace the batteries before they run out, as failure to replace batteries can result in excessive heating or cooling of your house.
- Always replace the batteries once a year, even if the "Low Batt" indicator does not flash. Replacing the batteries also helps to prevent leakage that can corrode and damage the thermostat.
- If you are leaving your home for a month or more, you should replace the batteries as a precaution against battery failure in your absence.
- Failing to replace the batteries when necessary could cause the thermostat to lose power or malfunction. If the thermostat loses power, then the thermostat will not control the temperature, which could result in your HVAC system not functioning as you intended and lead to possible damage from excessive heating or cooling.
- If the thermostat batteries fail with the heat OFF, this can result in NO HEAT and possible frozen or broken pipes and water damage.
- If the thermostat batteries fail with the cool OFF, this can result in NO COOL and could cause possible damage or excessive temperatures.

HVAC Setup

HVAC selection switches must be set first (see page 12), then make sure the CT100 is powered up and the mode is set to Off.

Access HVAC Setup



1. Trip the RESET button (see Operation Guide page 23) to implement the HVAC switch selections.
2. With mode in Off, touch Menu and then HVAC Setup.
3. Use Temperature Adjustment arrows to adjust the HVAC Setup number. The display will show your selection and indicate the number of stages you have selected.
4. During setup, 2nd stage will blink when both heat and cool have 2nd stages.

HVAC Setup Stage

Regular HVAC System

Heat Stage	Cool Stage	Screen Display	Select
1	1	H1C1	1
2	1	H2C1	2
1	2	H1C2	3
2	2	H2C2	4

Heat Pump HVAC system

HP Stage	Aux Stage	Screen Display	Select
1	0	P1	A
2	0	P2	B
1	1	P1A1	C
1	2	P1A2	D
2	1	P2A1	E
2	2	P2A2	F

⚠ CAUTION

Do not change the HVAC setup or HVAC selection switches if the thermostat is connected to a Z-Wave network. If you must change the HVAC system, first remove the thermostat from the network, change the HVAC setup, and then reconnect the thermostat to the network.

Test Installation

If you have a heat pump, leave the CT100 in Off mode for 4 minutes before checking Cool.

Do not operate AC if the outside temp is below 65°F.

To Check Fan (If you connected the G wire)

1. Touch the fan icon on the HOME screen to turn the fan ON.
2. Verify that air is blowing from the system. Touch the fan icon again to return to AUTO.

To Check Heat

1. Touch the temperature display to open the Manual screen.
2. Use the ◀ or ▶ arrows to set the mode to Heat.
3. From the Manual screen, touch the Temperature Up arrow until the target temperature is 5º above room temperature. Allow the system two (2) minutes to respond.
4. Verify that heat is blowing from the system. Return the target temperature to a normal setting.
5. From the Manual screen, set the mode to Off.

To Check Cool

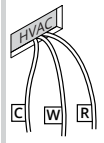
1. Touch the temperature display to open the Manual screen.
2. Use the ◀ or ▶ arrows to set the mode to Cool.
3. Touch the Temperature Down arrow icon until the target temp is 5º below room temperature. Allow the system five (5) minutes to respond.
4. Verify that cool air is blowing from the system. Return the target temperature to a normal setting.
5. From the Manual screen, set the mode to Off.

Wiring Diagrams

Detailed Wiring Diagrams

3 Wire Heat

WIRES
C W R



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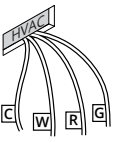
4 Wire Heat

WIRES
C W R G



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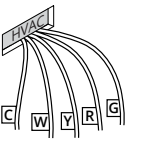
5 Wire Heat/Cool

WIRES
C W Y R G



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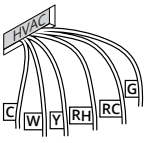
6 Wire Heat/Cool

WIRES
C W Y RH RC G



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Multi-stage Cool
Multi-stage Heat

WIRES
C Wn Yn R G

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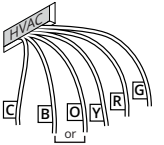
4 Wire Heat Pump
w/o Aux Heat

WIRES
C B or O Y R G



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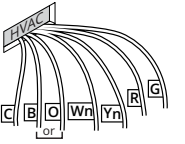
Multi-stage Heat Pump
w/ Multi-stage Aux Heat

WIRES
C B or O AUXn Yn R G



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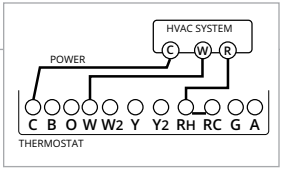
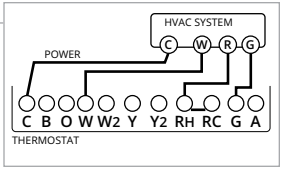
Step-By-Step Wiring Diagrams

3 Wire Heat GAS MILLIVOLT or 24VAC System



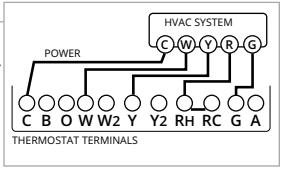
1. Connect the R (or RH) wire to the RH terminal. This connects the heat power.
2. Connect the W wire to the W terminal. This connects the heat.
3. Connect the C wire to the C terminal. Your HVAC system is now connected to the CT100.
4. Go to "Connect Your Wires" on page 9.

4 Wire Heat



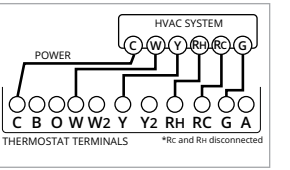
1. Connect the R (or RH) wire to the RH terminal. This connects the heat power.
2. Connect the W wire to the W terminal. This connects the heat.
3. Connect the G wire to the G terminal. This connects the fan.
4. Connect the C wire to the C terminal. Your HVAC system is now connected to the CT100.
5. Go to "Connect Your Wires" on page 9.

5 Wire Heat/Cool



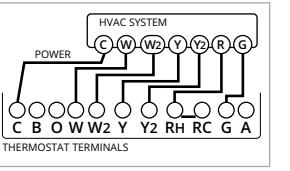
1. Connect the W wire to the W terminal. This connects the heat.
2. Connect the Y wire to the Y terminal. This connects the cooling compressor.
3. Connect the RH or R wire to the RH terminal. This connects the power.
4. Connect the G wire to the G terminal. This connects the fan.
5. Connect the C wire to the C terminal. Your HVAC system is now connected to the CT100.
6. Go to "Connect Your Wires" on page 9.

6 Wire Heat/Cool



1. Connect the W wire to the W terminal. This connects the heat.
2. Connect the Y wire to the Y terminal. This connects to the cooling compressor.
3. Disconnect the Rc and Rh terminals by placing the removing the Jumper Wire.
4. Connect the RH wire to the RH terminal and the RC wire to the RC terminal. This connects power.
5. Connect the G wire to the G terminal. This connects the fan.
6. Connect the C wire to the C terminal. Your HVAC system is now connected to the CT100.
7. Go to "Connect Your Wires" on page 9.

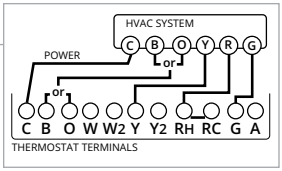
Multi-stage Heat & Multi-Stage Cool



The CT100 can handle up to 2 stages of HEAT and 2 stages of COOL.

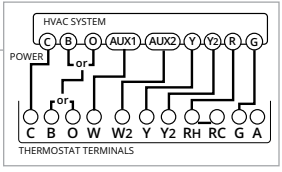
1. Connect the W and W2 wires to the W and W2 terminals. This connects the stages of HEAT.
2. Connect the Y and Y2 wires to the Y and Y2 terminals. This connects the stages of COOL.
3. Connect the RH or R wire to the RH terminal. This connects the power.
4. Connect the G wire to the G terminal. This connects the fan.
5. Connect the C wire to the C terminal. Your HVAC system is now connected to the CT100.
6. Go to "Connect Your Wires" on page 9.

4 Wire Heat Pump (heat/cool) without Auxiliary Heat



1. Connect the O wire to the O terminal or the B wire to the B terminal. This connects the change-over valve. If you have both O and B, connect only the O wire to the O terminal and DO NOT connect B to B terminal (see the Wire Reference Table on page 23 for Trane terminal labels).
2. Connect the Y wire to the Y terminal. This connects the compressor.
3. Connect the R wire to the RH terminal. This connects the power.
4. Connect the G wire to the G terminal. This connects the fan.
5. Connect the C wire to the C terminal. Your HVAC system is now connected to the CT100.
6. Go to "Connect Your Wires" on page 9.

Multi-stage Heat Pump with Multi-Stage Aux Heat

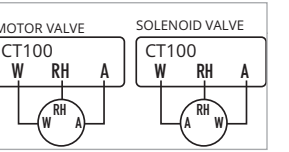


The CT100 can handle up to 2 stages of Pump compression and 2 stages of AUX heat.

1. Connect O wire to the O terminal or the B wire to the B terminal. This connects the change-over valve. If you have both O and B, connect only the O wire to the O terminal and DO NOT connect B to B terminal (see Wire Reference Table on page X for Trane terminal labels.).
2. Connect the AUX 1 and AUX 2 wires to the AUX 1 and AUX 2 terminals. This connects the auxiliary heat.
3. Connect the Y and Y2 wires to the Y and Y2 terminals. This connects the compressor.
4. Connect the R wire to RH terminal. This connects the power.
5. Connect the G wire to the G terminal. This connects the fan.
6. Connect the C wire to the C terminal. Your HVAC system is now connected to the CT100.
7. Go to "Connect Your Wires" on page 9.

Accessory Wiring

Zoned Hot Water Heat



For Solenoid or Motor valves, connect the wires based on the diagrams to the correct terminal on the CT100.

- USE ONLY IN HEAT MODE.
- The CT100 must be powered by 24v ac.

The third wire on your valve may be called 6, Y, or G (see the Wire Reference Table on page 23.

Wire Reference Table

Possible Wires	What They Control
R or V or VR	RH and RC Single power for HEAT and COOL
RH or 4	RH Power for HEAT (RH not connected to RC jumper clip removed)
RC	RC Power for COOL (RH not connected to RC jumper clip removed)
W	W Heat control
W2	W2 2nd stage HEAT or heat pump auxiliary heat
W3	W3 3rd stage HEAT or 2nd stage of 2 stage auxiliary heat
Y	Y COOL control or 1st stage compression for heat pump
Y2	Y2 2nd stage COOL control or 2nd stage compression for a heat pump
G or F	G FAN control
C or X	C 24VAC power (to power thermostat) NOTE: TRANE uses B for this connection
H	H External Humidifier
DH	DH External De-Humidifier
EX	EX external fresh air baffle
B	B Heat pump changeover (cool to heat, powered in heat)
O	O Heat pump changeover (heat to cool, powered in cool)
B and O	IMPORTANT: If there are both B and O wires (Trane pump products) DO NOT CONNECT B to B terminal. Instead, connect B to C terminal. If not a Trane product, tape off B.
E	n/a Emergency heat (do not connect, tape off)
L	n/a System monitor (do not connect, tape off)
T	n/a Outdoor sensor (do not connect, tape off)

Lennox Heat Pump	
V or VR or R	RH Power for HEAT
M or Y	Y COOL control
Y or W or W2	W2 2nd stage HEAT
F or G	G Fan control
R or O	O
X or X2 or C	C
Trane Products [American Standard]	
B	C 24VAC power (to power thermostat)
W or W1	W2 2nd stage HEAT
X2	Emergency heat. Do not connect, tape off.
Zoned Hot Water	
2 wire	
R	RH
W	W
Motor Driven Valves	
3 Wire	
R or 5	RH (power)
W or 4	W (heat ON)
Y or G or 6 (the 3rd wire)	A (heat OFF)
Solenoid Valves	
3 Wire	
R	RH (power)
W	A (heat ON)
Y or G (the 3rd wire)	W (heat OFF)

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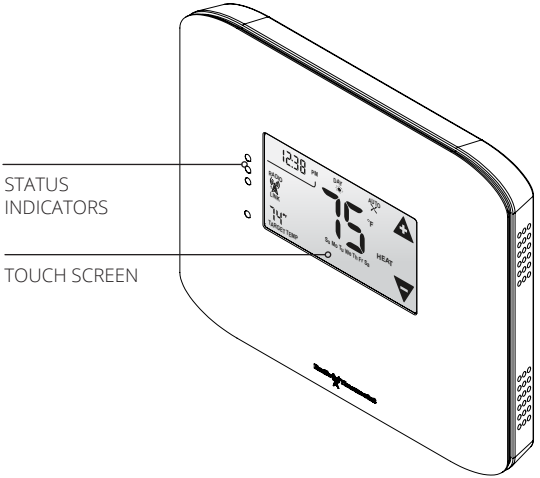
Product Overview

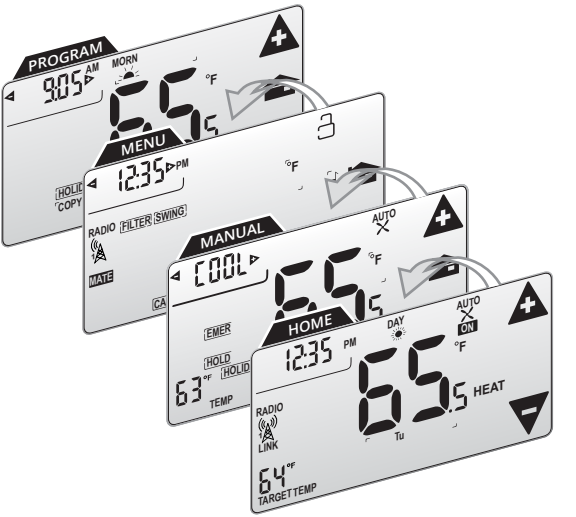
Exterior View



The CT100 Z-Wave thermostat operates via a high-quality, easy-to-use touch screen. Simply touch your finger firmly to the screen to set or adjust your CT100; the screen will automatically light up and you will hear a beep. To avoid scratching the screen, do not use a sharp or metallic device.

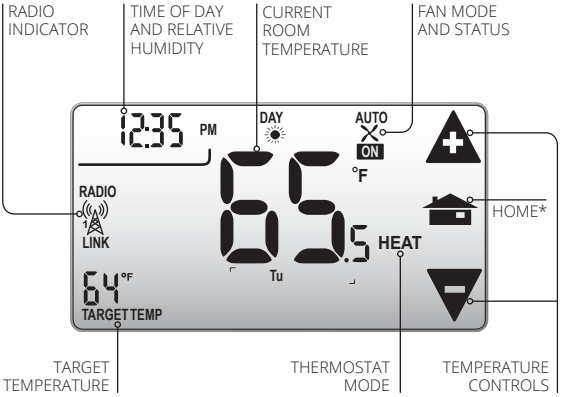
Screens

Before you operate the CT100, familiarize yourself with the basic control screens. The touch screen enables you to select (by touching) an item and change it. All the CT100 functions are accessed through these screens:



Home Screen

The Home screen displays when the unit is operating. Features you can control on the Home screen are temperature override, fan mode, toggling the time and relative humidity display, and opening the Manual screen.



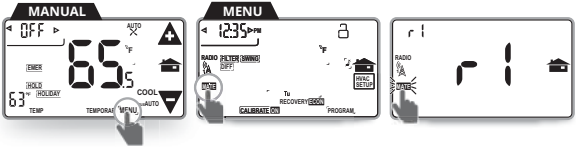
Touching the icon on other screens will return you to the previous screen.

*Home icon visable of Home screen only in Off mode.

Connecting the CT100 to a Z-Wave® Network

The CT100 is a Z-Wave® compliant thermostat. It has an onboard radio that can be connected to an existing Z-Wave® network. This device can be used on a network with products from different vendors.

1. Set your primary controller to INCLUDE mode to add the thermostat as a node on your network (see your specific controller's User Manual for detailed instructions).
2. From the CT100's Menu screen, touch MATE under the radio icon. The Network Include screen displays a large r1.



3. Touch MATE again. This initiates the network connection (mating) process. The MATE icon and the status indicator LEDs will blink.

   When the CT100 has successfully joined a Z-Wave network, the MATE icon is replaced by the LINK icon under the radio tower.

   Similarly, when you are trying to disconnect from (leave) a network, the LINK icon disappears when the node has successfully left the network.

4. Your controller indicates that the thermostat was successfully added to its network (see your specific controller's User Manual for details.)

Z-Wave and HVAC Setup

Do not change the HVAC setup or HVAC selection switches if the thermostat is connected to a Z-Wave network.

If you need to change the HVAC system:

1. Remove the thermostat from the Z-Wave network.
2. Change the HVAC Setup selection. See Install Guide page 15 for full instructions.
3. Connect the thermostat to the Z-Wave network.

Z-Wave and Power Supply

The thermostat's node type is fixed when it connects to the Z-Wave network; if the C-Wire is not connected and is only battery-powered when connecting to the network, the thermostat will remain a frequent listening routing slave (FLiRS) node until it is removed from the network.

When your thermostat is running on battery power, the Z-Wave radio will turn off to help conserve battery life. The CT100 Z-Wave radio module supports Z-Wave beaming, which allows other devices in the network to wake up the Z-Wave module and accept commands and then go back to sleep.

When your thermostat is running on C-Wire power, the Z-Wave radio will stay on and actively help route messages within the Z-Wave network. The thermostat's node type is fixed when it connects to the Z-Wave network; if the C-Wire is present and powered when connecting to the network, the thermostat will remain an always-listening node until it is removed from the network.

Z-Wave and Thermostat Program

To get the most out of your new thermostat, it needs to be paired to a Z-Wave system. When you are paired to a Z-Wave system, the Z-Wave application on your device controls your thermostat's programs. You can still temporarily override settings on the thermostat itself, but otherwise you can control it remotely. No Z-WAVE system? See "Customizing Programming" on page 34.

Thermostat Program

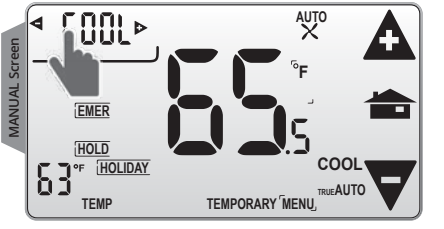
EPA Recommended Energy-Efficiency Program Settings

HEAT				COOL			
MORN	**DAY**	**EVEN**	**NIGHT**	**MORN**	**DAY**	**EVEN**	**NIGHT**
6 am	8 am	6 pm	10 pm	6 am	8 am	6 pm	10 pm
70°F	62°F	70°F	62°F	78°F	85°F	78°F	82°F

The CT100 thermostat automatically includes EPA recommended heating and cooling programs. If it does not fit your needs, you can adjust the programs instead. To run one of these preset programs, simply set the thermostat mode to Heat or Cool.

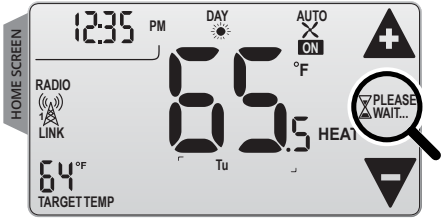
Run Pre-Set Program

1. Set Time & Day (see page 42)
2. Access the Manual screen by touching the Temperature on the Home screen.
3. Set the mode to Heat or Cool.
4. Touch .
5. The unit is now running the program.



Compressor Protection

The CT100 has a minimum cycle time of four (4) minutes to protect your compressor from excessive wear from responding to thermostat changes. The Home screen shows an hour glass and the message “Please Wait...” during this time, and the compressor will not come on until the four minute delay is over.

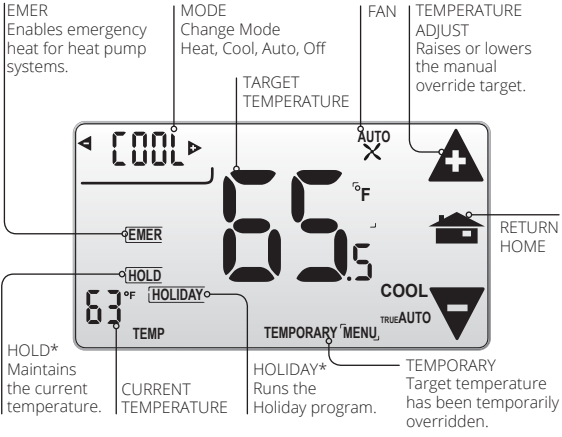


Customization

Manual Screen

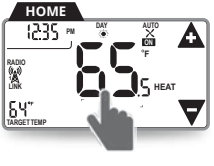
The Manual screen enables you to make temporary changes to how your CT100 operates.

Features you can control on the Manual screen: Thermostat Mode, Fan Mode, Target Temperature Override, and more. The following pages provide detailed function settings.



** These icons are not visible when the thermostat is connected to a Z-Wave network.*

To access the MANUAL screen



Touch the temperature on the Home screen to open the Manual screen.

Manual Screen Functions

The Manual screen enables you to issue manual override commands.

The Mode must be currently set to Heat or Cool to access most functions on the Manual screen.

Mode

The Mode settings for the CT100 are Heat, Cool, Auto, or Off.

- Touch the Mode area once to step to the next mode.
- To return to the mode you were previously in, touch the Mode area until the mode you were in appears.
- See page 45 for details to adjust Heat and Cool modes.

Temperature

- Touch the Temperature Adjust arrows to select your desired target temperature.
- Touch  when done.

Holiday

HOLIDAY ON Holiday Enabled	HOLIDAY Holiday Disabled

This function enables the one-day Holiday setting of the current program. This setting may have different start times and target temperatures. Touch icon to toggle between Enabled and Disabled.

Hold

HOLD ON Hold Enabled	HOLD Hold Disabled

This function causes the thermostat to attempt to keep the room at the current room temperature. Touch icon to toggle between Enabled and Disabled

Manual Screen Functions Cont.

EMER

Requires the CT100 HVAC TYPE be set to Heat Pump.

If you set your CT100 HVAC type to Heat Pump with the HVAC setup program selected to enable auxiliary heat, the emergency function is available on the Manual screen. Enabling Emer On disables the heat pump and leaves auxiliary heat as your sole heating source.

Auxiliary heat is more expensive than the heat pump so use this feature only if the heat pump cannot keep up or is defective. This manual override stays active until you disable emer by switching the thermostat to another mode.

EMER ON EMER Enabled	EMER EMER Disabled
To Enable EMER From the Manual screen, touch EMER. The display shows Emer On and the heat pump is disabled.	**To Disable EMER** From the Manual screen, touch the Mode area and cycle through until Heat is displayed again.

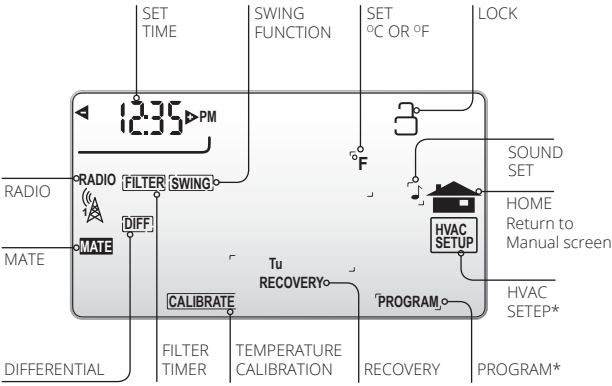
Fan Control

AUTO Auto Fan Mode	ON Fan On
Auto Mode The fan operates automatically with the HVAC system and the thermostat. • Switch to Auto by touching the X again.	**Fan On** The fan will run continuously in this manual override until switched back to Auto. • To use the fan for simple ventilation, turn the thermostat mode to Off (see Mode section on previous page) • Touch X to turn the Fan On.

Menu Screen

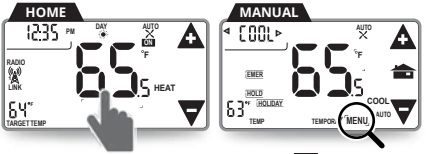
The Menu provides access to many features and settings of the CT100.

Features you can control on the Menu screen are ºF / ºC setting, thermostat calibration, filter replacement reminder, and more. The following pages provide detailed function settings.



* *These icons are not visible when the thermostat is connected to a Z-Wave network.*

To access the MENU screen



1 Touch the temperature on the Home screen to open the Manual screen.

2 Touch Menu to display the Menu screen.

Menu Screen Functions

Swing (HVAC Cycling Rate)

This feature enables you to set the acceptable variance in temperature between the CT100's setting and the current room temperature before the heating or cooling system will turn on. The Swing range can be from 0.5 to 4.0F (.25 to 2C). For example, if Swing is set to 2.0°F and the CT100 is set to 70°F target temperature, the heat cycle will start when the room temperature drops to 68°F. Similarly, the cooling system will start when the room temperature increases to 72°F. The HVAC runs until the room reaches the target temperature, and then shuts off.

To set Swing

1. From the Menu screen, touch Swing.
2. Touch Time Adjustment arrows to set the SWING from 0.5° to 2.0°F. The HVAC will run more frequently at .5°F and less frequently at 2°F. The default is 1°F.
3. Touch to return to the Menu screen.

Set Time Of Day

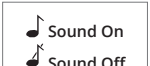
- Touch arrows to set the current time.
- Touch and hold an arrow to move in 15 minute increments.

Set Fº or Cº

- Toggle between the ºF, ºC to switch back and forth

Sound

When enabled, the chirp sounds when you change to a new screen or change a setting.



Filter

To help you remember to replace your air filters, use the filter replacement reminder count-down (in days). Setting this value to 0 disables the reminder.

Menu Screen Functions Cont.

Set Filter Reminder

1. From the Menu screen, touch Filter.
2. Touch the Days counter to set a value between 0 and 999 days.

Differential

Used for multiple stage systems only. Not available on-screen for single stage systems.

The Differential is the number of degrees between the room temperature and the target temperature at which the 2nd stage will engage to bring the room temperature back to the target. The default is 2°F. The programmable range is 2°F to 6°F (1°- 3°C).

To Change the Differential

1. From the Menu screen, touch DIFF.
2. Use the ◀ or ▶ arrows to set the Differential value. 2°F is standard for very cold climates, and 4°F for warm climates.
3. Touch to return to the Menu screen.

Mate

This icon indicates that the CT100 is not connected to a Z-Wave network. For instructions on connecting, see page 30.

Calibrate

Your thermostat was accurately calibrated at the factory to ±1° F of actual ambient temperature. However, you can change the display temperature to match that of a previous thermostat, or to match another thermostat already in your home. The range of change is from -6°F to +6°F (-3°C to +3°C).

To change your Thermostat Calibration:

1. From the Menu screen, touch Calibrate.
2. Use the Temperature Adjust arrows to adjust the displayed temperature up or down, as desired in 0.5° (F or C) increments.

   The temperature value in the lower left corner of the screen adjustments to show the changed temperature value. The central display shows the modified temperature reading that will be displayed on the Home screen and used as the new room temperature.
3. Touch to return to the Menu screen.

Menu Screen Functions Cont.

Recovery

The Recovery function determines whether your HVAC system will attempt to meet the programmed target temperature quickly.

ECON Economy Recovery (Slower)	**FAST** Fast Recovery

Touch Recovery icons to toggle between settings.

HVAC Setup

When the unit mode is Off (see page 12 for details), touch HVAC Setup to enter the HVAC settings screen. For details on using this screen, see the CT100 Installation Guide.

Lock

The Lock feature prevents thermostat changes via the touchscreen. Lock feature does not restrict Z-Wave access. Unlock allows all changes; Partial lock allows temporary temperature adjustments; Full lock prevents all changes.. The CT100 has 3 lock modes:

Unlock	Partial Lock	Full Lock

Partial Lock

- From the Menu screen, touch Unlock for 5 seconds. The Lock icon changes to show Partial Lock. In this mode, you can only temporarily override the CT100 target temperature with the Temperature Adjust arrows.

Full Lock

- From the Menu screen, touch the Partial Lock for 5 seconds to show the Full Lock icon. Once locked, you cannot make any changes; the CT100 only responds to touching and Menu.

Unlock

- If in Partial Lock, touch and hold icon for 5 seconds to switch to Full Lock.
- If in Full Lock, touch and hold icon for another 5 seconds. Each 5 second touch and hold must be separate.

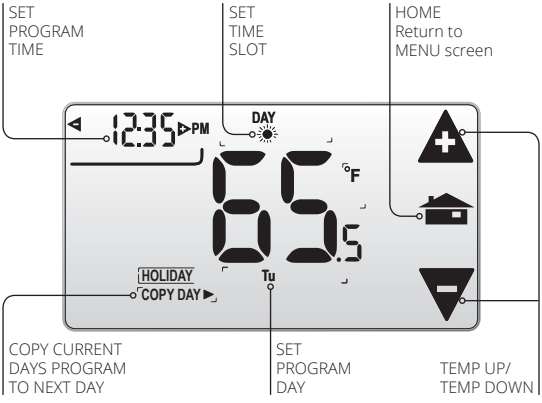
  NOTE: Unlocking has to go this direction:
  Unlock > Partial Lock > Full Lock > Unlock
- Touch to return to the Manual screen.

Thermostat Schedule

Program Screen

The Program screen manually controls your settings when not using a Z-Wave system.

Features you can control on the Program screen are set program start time, set time slot, target temperature, and more. The following pages provide detailed function settings.



When the thermostat **is not** connected to a Z-Wave network, you can change the programs that the thermostat runs from the device only.

If the thermostat **is** connected to a Z-Wave network, manual programming is disabled, and is instead controlled by the Z-Wave network.

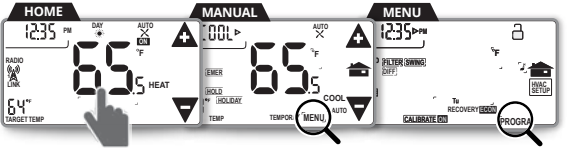
Accessing the PROGRAM screen (next page)

Program Functions

Access Heat and Cool Programs

Heat and Cool programs are separate. Repeat these steps as necessary for each program.

Make sure the current Mode is set to either Heat, Cool or Auto, depending on which program you want to adjust (page 36 for details).



1 Touch the temperature on the Home screen to open the Manual screen.

2 Touch Menu to open the Menu screen.

3 Touch Program to open the Program screen.

Program Schedule Recommendations

The CT100s flexibility lets you create programs that meet your specific needs:

7 Day

Different programs for every day of the week, to suit changing schedules

5 – 2

One program for routine workdays, and a separate one for weekend days.

5 – 1 – 1

One program for routine workdays, and separate programs for each weekend day

Holiday

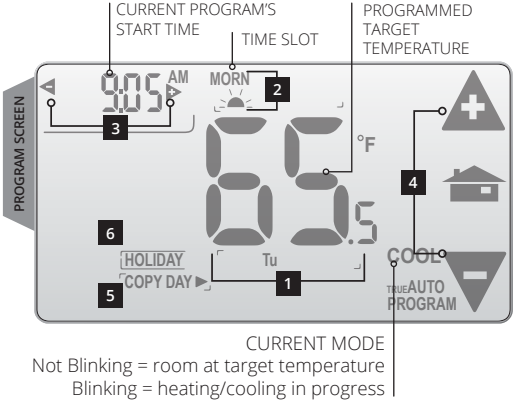
A special one-day program that repeats every day. Holiday program can be used as a temporary override to your Cool and Heat prorgrams by manually selecting Holiday on the Menu screen.

Modify Programs

To Adjust Heat and Cool Programs

1. Select the Day **1** you want to program. Touch the day of the week area to cycle through the days to the desired day.
2. Select the Time Slot **2** you want to program. Touch the time slot area to cycle through to select the desired period.
   MORN DAY EVEN NIGHT
3. Set the desired start time of that time slot. Touch the time arrows **3** to select the desired period's starting time. Hold down time arrow for fast time scrolling.
4. Select the desired target temperature for that time slot. Touch the Temperature Adjust arrows **4** to select the desired period's temperature.
   - Repeat Step 2 - 4 to set remaining Time Slots.
5. Touch Copy Day **5** once. The settings for the current day will be copied to the next day, which will appear on the screen. Make any necessary adjustments.

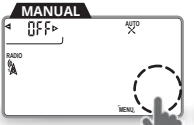
   NOTE: Hold down Copy Day for 3 seconds to copy to all 7 days.
6. Touch the Day field until Holiday **6** is displayed. Follow steps 2-4 to define how the program should run when the Holiday setting is enabled.
7. Touch to return to the Menu screen.



Device Information

Display Thermostat Firmware & Radio Module Versions

1. Switch the thermostat to Off Mode (see page 36 for details).



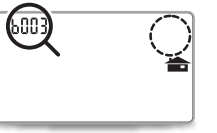
2. Press and hold the Temperature Adjust down arrow for three (3) seconds. The icon is not visible in Off Mode.

3. The thermostat's firmware version displays in the Mode area of screen.

4. Press the Temperature Adjust down arrow to display the thermostat's radio module version.

5. Press to return to the Manual screen.

Display Days Since Last Reset



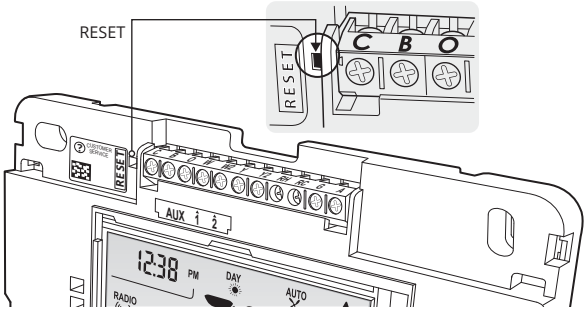
1. Switch the thermostat to Off Mode (see page 36 for details).
2. Press & hold Temperature Adjust up arrow, and the upper left will show the letter "b" followed by three numbers. The numbers indicate the days since the device was last reset.

Reset & Restore

Reset

The RESET trigger re-boots the CT100 processor. It does not affect the target temperatures that have been stored in permanent memory.

1. Remove the CT100 cover.
2. Using a narrow pointed implement, trip the Reset trigger.



Restore Thermostat & Z-Wave Module to Factory Default

1. Switch the thermostat to Off Mode (see page 36 for details).
2. Press and hold the lower left corner of touch screen for five (5) seconds. The thermostat then resets itself, displays its current firmware version, and restarts in Off Mode.

Restore Z-Wave Module to Factory Default

1. From the Menu screen, touch Mate icon. The Radio screen appears.
2. Touch & hold Mate icon ten (10) seconds until you hear a beep. The thermostat will restore the Z-Wave module to the factory default settings.

CT100 THERMOSTAT

Z-WAVE® REFERENCE

Z-Wave® Reference

The CT100 can work in the same network with any other certified Z-Wave device, regardless of manufacturer/vendor. See your specific Z-Wave® controller's User Manual for detailed instructions on operating your thermostat through the network.

Behavior Note: When power is first applied to this device it will broadcast a Hail message followed by a Node Information frame. This behavior is to maintain backwards compatibility with older controllers that work with this line of devices.

Z-Wave Lifeline

The following commands can be sent to lifeline:

- Command Class Sensor Multilevel - Sensor Multilevel Report
- Command Class Basic - Basic Report
- Command Class Thermostat Mode - Thermostat Mode Report
- Command Class Thermostat Operating State - Thermostat Operating State Report
- Command Class Thermostat Fan Mode - Thermostat Fan Mode Report
- Command Class Thermostat Fan State - Thermostat Fan State Report
- Command Class Thermostat Setpoint - Thermostat Setpoint Report
- Command Class Multichannel - Multi Channel Command Encapsulate

These can be accessed via an Association Group Info Command List Get for group 1 (lifeline)

Advanced Z-Wave® Information

The CT100 supports compliant mapping of the Z-Wave® BASIC_ COMMAND_CLASS to the CT thermostat "Energy Saving" and "Comfort Mode" as follows:

- Basic Set (Value = 0x00) = Set Energy Saving Mode
- Basic Set (Value = 0x01-0x63 & 0xFF) = Set Comfort Mode

Energy Savings applies a 4° F setback to the existing set point temperature to comply with EPA recommendations for energy savings.

Anti-theft

The Anti-Theft Command Class disables a subset of supported/ controlled command classes in the thermostat if the thermostat is being disconnected from and reconnected to a Z-Wave network. (This thermostat supports version 2 of the Anti-Theft Command Class.) This command class is typically used when installing a thermostat in a public location, such as a hotel room or conference center. The command class allows the user to lock the thermostat to the actual Z-Wave network and to render it useless if it is removed from the local network without being unlocked. Another application would be to protect service-provider-owned products from leaving the service providers network before they are paid for.

Disabled Commands With Engaged Anti-Theft protection

Basic Command	Clock Command
Indicator Command	Manufacturer Specific Command
Multilevel Sensor Command	Thermostat Mode Command
Thermostat Operating State Command	Thermostat Fan Mode Command
Thermostat Fan State Command	Thermostat Setpoint Command
Version Command	Configuration Command
Battery Command	Association Command
Anti-theft Command	Multi Channel Command (Only supported if a humidity sensor is present.)

Configuration Parameters

This device supports the following Configuration Parameters:

	Name	Set/Get	Default	Values
1	Temp Reporting Threshold	Set/Get	2	0 to 4
2	HVAC Settings	Get Only	N/A	see below
3	Utility Lock Enable/Disable	Set Only	0	0 to 127
4	C- Wire/Battery Status	Get Only	N/A	0 or 1
5	Humidity Reporting Threshold	Set/Get	2	0 to 3
6	Auxiliary/Emergency	Set/Get	0	0 or 1
7	Thermostat Swing Temp	Set/Get	2	1 to 8
8	Thermostat Diff Temp	Set/Get	4	4 to 12
9	Thermostat Recovery Mode	Set/Get	2	1 or 2
10	Temp Reporting Filter	Set/Get		see below
11	Simple UI Mode Enable/Disable	Set/Get	1	0 or 1
12	Multicast Enable/Disable	Set/Get	0	0 or 1

1. Temperature Reporting Threshold (8-bit)

This value determines the reporting threshold when association reporting is enabled. Unsupported values are ignored.

Value	0	1	2	3	4
Treshhold	Disabled	Disabled	0.5°F	1.0°F	1.5°F

2. HVAC Settings (32-bit)

Byte 1 = HVAC Setup: Normal (0x01) or Heat Pump (0x02)

Byte 2 = Aux Setup (Gas (0x01) or Electric (0x02)) & Number of Auxiliary Stages (Heat Pump)/Number of Heat Stages (Normal)

Byte 3 = Number of Heat Pump Stages

Byte 4 = Number of Cool Stages

3. Utility Lock (8-bit)

If set to 0, the utility lock is disabled. All other values (1-255) enable the utility lock.

4. C-Wire/Battery Status (8-bit)

If 0x01, the thermostat is powered by a C-wire. If 0x02, the thermostat is powered by batteries.

5. Humidity Reporting Threshold (8-bit)

This value determines the reporting threshold when association reporting is enabled. Unsupported values are ignored.

6. Auxiliary/Emergency (8-bit)

If set to 0, auxiliary / emergency heat is disabled. All other values (1-255) enable auxiliary / emergency heat. This can only be enabled when the thermostat is set to Heat Pump mode.

7. Thermostat Swing Temp

The thermostat swing temperature is in units of 0.5 degrees Fahrenheit. A value of 0x01 is 0.5F and 0x02 is 1.0F. The supported values may vary from thermostat to thermostat but typically the allowed values are 0.5F (0x01) to 4.0F (0x08).

8. Thermostat Diff Temp

The thermostat differential temperature is in units of 0.5 degrees Fahrenheit. A value of 0x04 is 2.0F and 0x06 is 3.0F. The differential temperature must be an integer value. Non-integer values, such as 1.5F (0x03), should not be used. The supported values may vary from thermostat to thermostat but typically, the allowed values are 2.0F (0x04) to 6.0F (0x0C).

9. Thermostat Recovery Mode

The Thermostat Recovery Mode can be either fast (0x01) or economy (0x02).

10. Temp Reporting Filter (16-bit)

Set Command Definition

When setting parameter 10, the set command must contain 4 bytes whereas the report frame will only contain 2 bytes. This is because the additional 2 bytes in the set command qualify the values being set. In this way the temperature threshold values can be set in either Fahrenheit or Celsius.

So a set command will look like this: 0A 04 aa bb cc dd, where:

aa = either 01 to indicate that bb is in Celsius, or 09 to indicate that bb is in Fahrenheit

bb = the value of the lower bound (0 to 124)

cc = either 01 to indicate Celsius that dd is in, or 09 to indicate that dd is in Fahrenheit

dd = the value of the upper bound (0 to 124)

<table>
<tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr>
<tr><td colspan="8">Command Class = COMMAND_CLASS_CONFIGURATION</td></tr>
<tr><td colspan="8">Command = CONFIGURATION_SET</td></tr>
<tr><td colspan="8">Parameter = 0x0A</td></tr>
<tr><td>Default</td><td colspan="5">RESERVED</td><td colspan="2">Size = 0x04</td></tr>
<tr><td colspan="3">Precision (0x00)</td><td colspan="2">Scale</td><td colspan="3">Bound Size (0x01)</td></tr>
<tr><td colspan="8">Temperature Filter Lower Bound</td></tr>
<tr><td colspan="3">Precision (0x00)</td><td colspan="2">Scale</td><td colspan="3">Bound Size (0x01)</td></tr>
<tr><td colspan="8">Temperature Filter Upper Bound</td></tr>
</table>

- Parameter (8-bit)
  The parameter is set to 10 (0x0A) for the temperature reporting filter.
- Default (1-bit)
  If the default bit is set, the upper bound is zero (0) and the lower bound is 124. This disables the filter.
- Size (3-bit)
  The Size field must be set to 4 (100b).
- Precision (3-bits)
  The precision field describes the precision of the temperature filter value. The filter must be zero (0x00).

- Scale (2-bits)
  The scale field indicates the temperature scale used: 0 indicates Celsius and 1 indicates Fahrenheit.
- Bound Size (3-bits)
  The size field indicates the number of bytes used for the temperature filter value. This field must be one (0x01).
- Temperature Filter Lower Bound (8-bit)
  The thermostat will report ambient temperature changes for temperature values less than the lower bound. This field must be between 0F and 124F. By default, this value is 124F (report all temperature changes).
- Temperature Filter Upper Bound (8-bit)
  The thermostat will report ambient temperature changes for temperature values greater than the upper bound. This field must be between 0F and 124F. By default, this value is 0F (report all temperature changes).

Thermostat Reporting Filter Report Command Definition

7	6	5	4	3	2	1	0
Command Class = COMMAND_CLASS_CONFIGURATION							
Command = CONFIGURATION_SET							
Parameter = 0x0A							
Precision (0x00)			Scale		Bound Size (0x01)		
Temperature Filter Lower Bound							
Temperature Filter Upper Bound							

- Parameter (8-bit)
  The parameter is set to 10 (0x0A) for the temperature reporting filter.
- Temperature Filter Lower Bound (8-bit)
  The thermostat will report ambient temperature changes for temperature values less than the lower bound. This field must be between 0F and 124F. By default, this value is 124F (report all temperature changes).

- Temperature Filter Upper Bound (8-bit)
  The thermostat will report ambient temperature changes for temperature values greater than the upper bound. This field must be between 0F and 124F. By default, this value is 0F (report all temperature changes).

11. Simple UI Mode Enable / Disable

If set to 0, Simple UI mode is disabled. If set to 1, Simple UI mode is enabled.

12. Multicast Enable/Disable (8-bit)

If set to 0, Multicast is disabled. If set to 1, Multicast is enabled.

FCC WARNING

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception (which can be determined by turning the equipment off and on), try to correct the interference by following these suggestions:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Statement Of Use

100% Compatible with all popular residential HVAC systems: 24VAC single stage and two stage conventional heating systems (gas, oil, electric), heat pumps with up to two stages of heat and up to two stages of auxiliary heat (electric or fossil), zoned forced air and zoned hot water (2 or 3 wire), millivolt systems (with a 12-24V AC or DC source), one or two stage cooling, and hybrid systems. Do not use this thermostat with with line voltage heating systems.