

Install Guide CT110

⚠ Caution

- **Turn off electricity to the HVAC system** before installing or servicing thermostat or any part of the system.
- Do not turn electricity back on until work is completed.
- Do not short (jumper) across electric terminals at the control on the furnace or air conditioner to test the system. This may damage the thermostat.
- All wiring must conform to local codes and ordinances.
- This thermostat is designed for use with 24 volt AC HVAC and millivolt gas systems. The thermostat is powered by 4AA alkaline batteries and/or 24 volt AC C wire (or a 12-24 AC or DC source). Each thermostat relay load should be limited to 1.0 amp; higher amperage may cause damage to the thermostat.
- Your thermostat is a precise instrument, handle it with care.

⚠ Caution

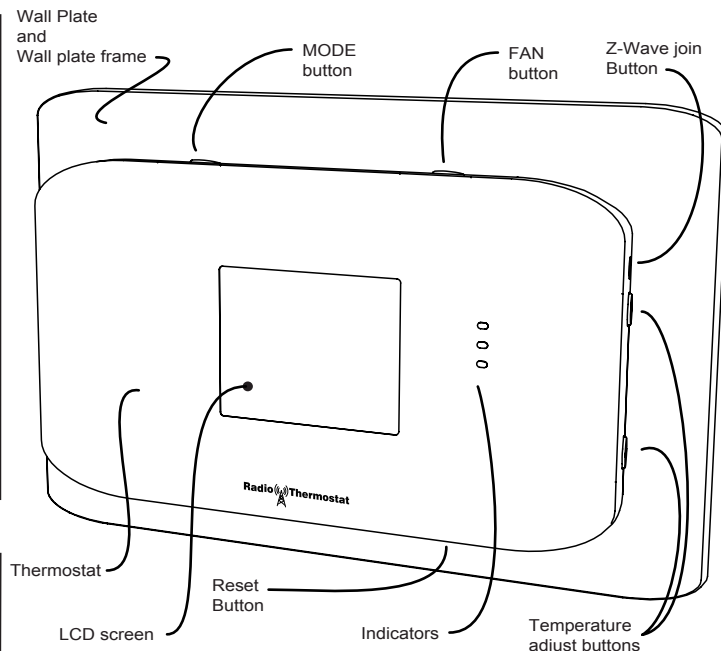
To avoid electrical shock and to prevent damage to the furnace, air conditioner, and thermostat, **disconnect the power supply** before beginning work. This can be done at the circuit breaker.

1308-001-001

INSTALLATION

Radio Thermostat

Radio Thermostat Company of America



ENGLISH

TOOLS

You will need a small Phillips screwdriver and a drill with 3/16-in. (4.8mm) bit for wall mounts.

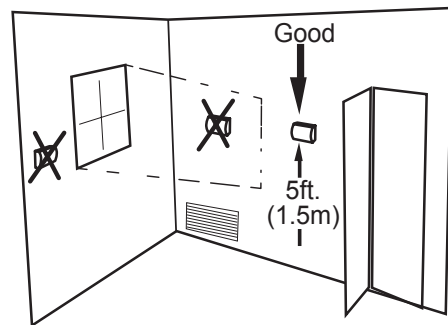
LOCATION

Replacement installations - mount the CT110 in place of the old thermostat.

A new location will require moving your wiring.

For new installations and relocating the CT110 - follow the guidelines listed below:

- Locate the thermostat on an inside wall, about 5 ft. (1.5m) above the floor, and in a room that is used often.
- Do not install it where there are unusual heating conditions, such as: in direct sunlight; near a lamp, radio, television, radiator register, fireplace; near hot water pipes in a 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 thermostat life.
- Do not locate where air circulation is poor, such as: in a corner, an alcove; behind an open door.
- Do not install the CT110 until all construction and painting has been completed.
- This thermostat does not require leveling.



REMOVE OLD UNIT

⚠ Switch OFF electricity to the HEATING and COOLING systems.

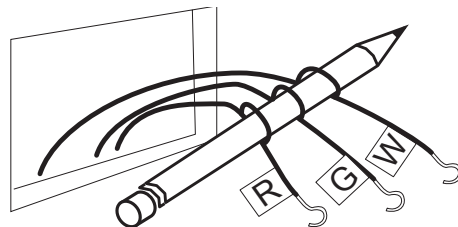
Then follow these steps:

- Remove cover from old thermostat. Most are snap-on types and simply pull off. Some have locking screws on the side or front. These must be loosened. **DO NOT** remove wires. Note the letters printed near the terminals. Attach labels (enclosed) to each wire for identification.

⚠ Caution

Read instructions carefully before removing any wiring from existing thermostat. Wires must be labeled before they are removed. THERE IS NO STANDARD COLOR CODE. When removing wires from their terminals, ignore the color of the wires and LABEL THEM by the lettered terminal where they were screwed.

- Label the wires one at a time. You must label all the wires before you proceed.
- With all wires labeled, remove them from the old unit.
- Make sure the wires do not fall back inside the wall. You can wind them around a pencil to keep them from falling.
- Loosen all screws on the old thermostat and remove it from the wall.

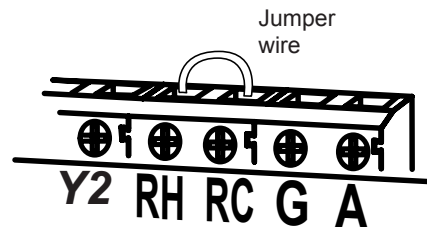


What wires do you have?

Make sure your wires are labeled. This may require you to find the 'other end' connection for each wire on your heating or air conditioning equipment and read the label there. Refer to the Wire Reference page at end of install section for better understanding of wire labels from different HVAC system makers.

⚠ IMPORTANT: The CT110 runs on 4 AA alkaline batteries and/or the C wire if available. 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. A constant power source is required when using a radio module.

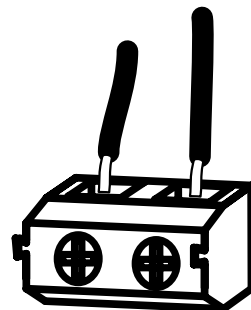
⚠ IMPORTANT: If you have both RH and RC you need to remove the jumper wire between these 2 terminals.



Prepare Wires

Please follow these guidelines for safe and secure wire connections:

- You will need at least 2.6" of wire for each of your connections to the CT110.
- If you do not have enough wire, splice additional wire to allow enough slack.
- Terminals accept wires from 16-22awg.
- Fan out wires below the hole as shown.
- Remove insulation 1/8" from the tip of each wire.
- When handling, take care not to damage the labels for each wire.

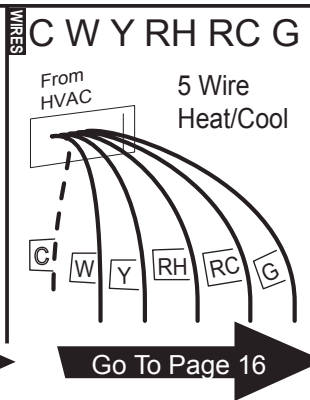
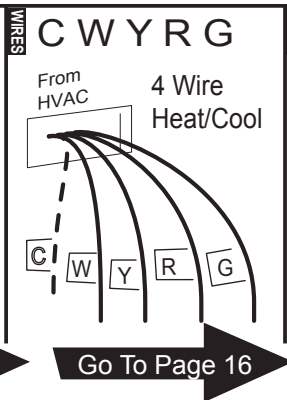
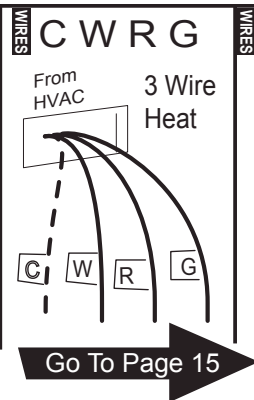
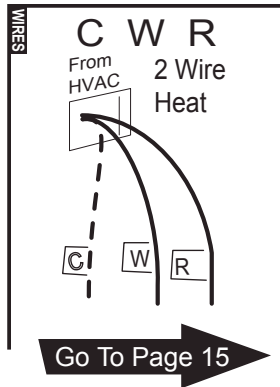


Wire Terminals

⚠ Caution

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

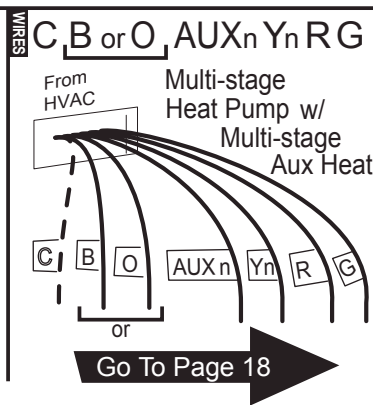
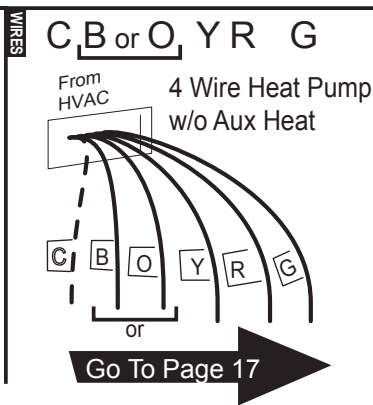
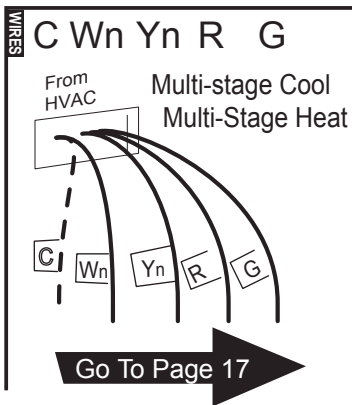
Find the step-by-step diagram for your system



- Select the reference page with your wiring diagram and set-up information below.

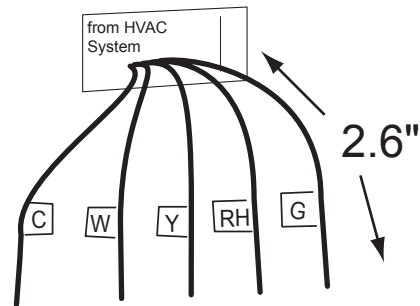
- The C-wire is optional but preferred. Without a C-Wire the CT110 will operate on batteries only for about one year.

- Hot water systems diagrams are on pg20.



- If your combination of wires is not above you can use the wiring table at the end if the install section to determine your connections, contact customer support for help.

- “Fan out” wires as illustrated with CT110 below the wall opening. As in the example: fan out the wires so that the C wire is above the C terminal, the W above the W. This allows the CT110 to fit snug to the wall.
- Position the wires through the wall plate to the terminal area.
- Do not bunch wires behind the wall plate. Feed any slack back into the wall opening.
- The Wall Plate Frame is optional, but you must have it in place when you thread your wires into the wall plate.

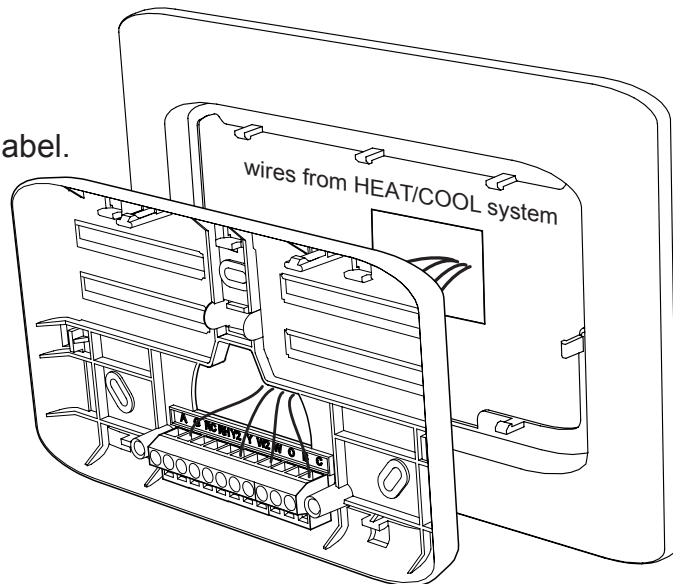


Connect Your Wires

- Connect labeled wires only to a terminal with the same letter label.
- Insert the wire in the terminal well and tighten the screw securely.

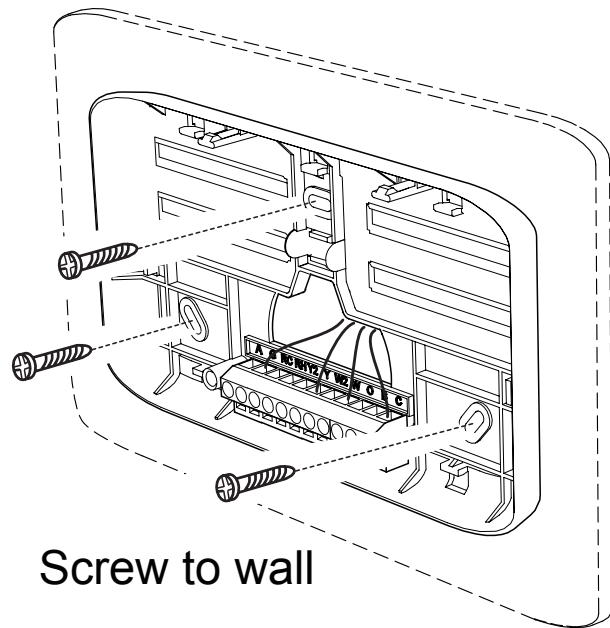
NOTE: You can mount the wall plate to the wall first, then connect the wires, and mount the CT110.

- The CT110 can be externally powered with a power source rated from 12V to 24V, AC or DC, at 100ma or greater. If used, connect to the C and RH terminals (no polarity).



Mount the Wall plate to wall

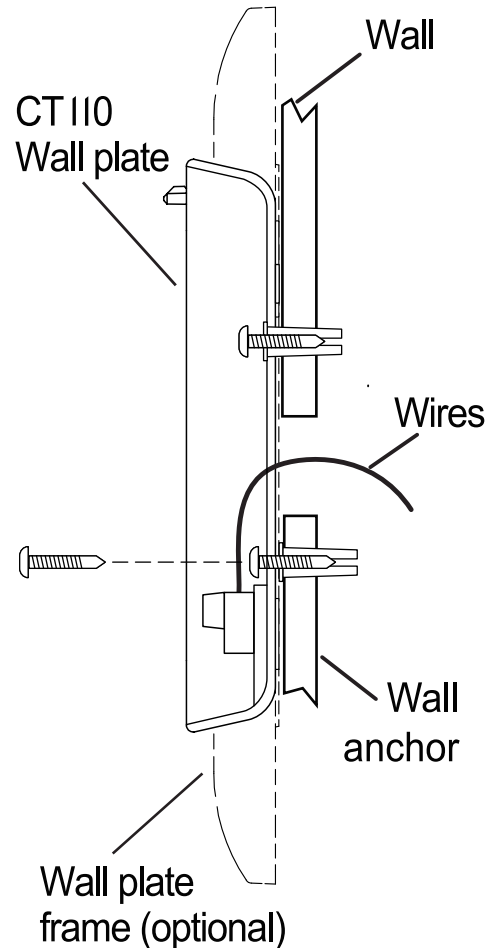
NOTE: If you are mounting to sheet rock or if you are using the old mounting holes, use the plastic anchors provided. Mark first and drill a 3/16-in.(4.8mm) hole for the insert at each screw location, then mount the unit.



1. Hold the CT110 wall plate against the wall, with the wires coming through the hole in the wall plate.

2. Position wall plate for best appearance.

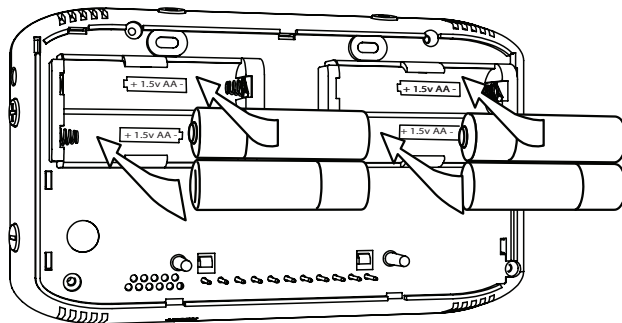
3. Attach the wall plate to the wall with the screws provided.



Install 4 AA Batteries

- Install 4 AA alkaline batteries [required] following the marked polarity in the battery compartments. Put the battery in negative end first against the spring, then push the positive end in.

The CT110 will power-up in the OFF mode. Your CT110 is not configured to operate your HVAC system yet. You must now configure your thermostat for your HVAC system before you mount it to the wall plate.



⚠ Caution

Special Thermostat Battery Cautions



Always replace the batteries as soon as the low battery indicator displays. The thermostat is a battery powered device. You must be responsible to replace batteries before they run out. Failure to replace batteries can result in overheating or excessive cooling of your house.

- Even if the low battery indicator display does not display, you should always replace the batteries at least once a year. 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.

- Always use new alkaline batteries.
- 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 overheating or excessive 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.bottom.

BATTERY WARNING

Do Not Use Re-chargeable Batteries

Do Not Mix Old And New Batteries.

Do Not Mix different battery types

ie. Alkaline, Standard (Carbon - Zinc), etc.

**DO NOT DISPOSE OF BATTERIES IN FIRE. BATTERIES
MAY EXPLODE OR LEAK.**

HVAC Setup on Screen

⚠ IMPORTANT: Make sure the CT110 is powered up and the mode is set to OFF. You must know what your heat source is at this time: either Gas/oil heat or Electric heat (or AUX type for heat pumps.)

- Press the **+** and the **-** buttons at the same time, for 10 seconds.
This will put you in the HVAC SET UP screen.
- Use **+/-** buttons to select HVAC SET UP code on screen. You must select the correct HEAT type for your system. In the upper left, the CT110 will display **GAS** for gas heat and **ELEC** for Electric heat for each code. For HEAT PUMP systems CT110 will display **GAS** for gas auxiliary and **ELEC** for Electric auxiliary for each code (if you have AUX heat).

The LCD display will show your selection. During setup, 2nd stage will blink when both heat and cool have 2nd stages.

If you have a Normal HVAC system...

- 1 stage HEAT, 1 stage COOL select **1**
- 2 stage HEAT, 1 stage COOL select **2**
- 1 stage HEAT, 2 stage COOL select **3**
- 2 stage HEAT, 2 stage COOL select **4**

If you have a HEAT PUMP HVAC system...

- HEAT PUMP with no AUX heat select **A**
- 2 stage HEAT PUMP with no AUX select **b**
- HEAT PUMP with AUX heat select **C**
- HEAT PUMP with 2 stage AUX heat select **d**
- 2 stage HEAT PUMP with AUX heat select **E**
- 2 stage HEAT PUMP with 2 stage AUX heat select **F**

Now double check that you have to select the correct HEAT TYPE for your system. **GAS** is for Gas or Oil heat, **ELEC** is for electric heat.

Snap CT110 to Wall plate

Snap the CT110 onto the wall plate. Take care to align with mounting posts at top and the contact pins at the bottom. With CT110 on the wall plate it is time to turn the AC power back on. Do this at the breaker you used to switch it off.

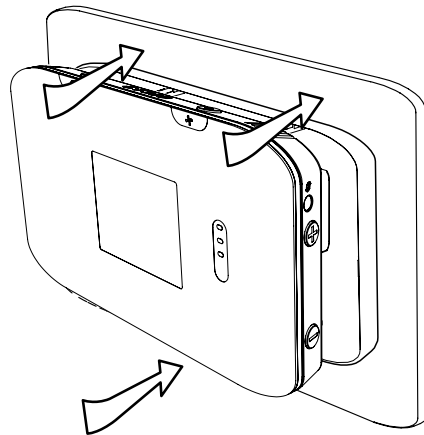
Test Installation

Follow these procedures to verify you have correctly installed the CT110.

TO CHECK FAN (If you connected the G wire) - Press the fan button to turn the fan **ON**. Verify that air is blowing from the system. Touch the fan icon again to return to **AUTO** setting.

TO CHECK HEAT - Set the mode to **HEAT** by pressing the MODE button until **HEAT** is displayed. Press the **+** button and raise the target temp to change target temperature to about 5°F above room temperature; allow the system 2 minutes to respond. Verify that heat is blowing from the system. Return the Target Temperature to a normal setting. Return mode to **OFF** by pressing the mode button. If you have a heat pump, leave in off for 4 minutes before checking COOL.

TO CHECK COOL (do not operate AC if the outside temp is below 65°F) - Set the mode to **COOL** by pressing the MODE button until **COOL** is displayed. Press **-** button and lower cool Target Temperature to change target temperature to about 5°F below room temperature. Allow the system 5 minutes to respond. Verify that cool air is blowing from the system. Return mode to **OFF** by pressing the mode button.

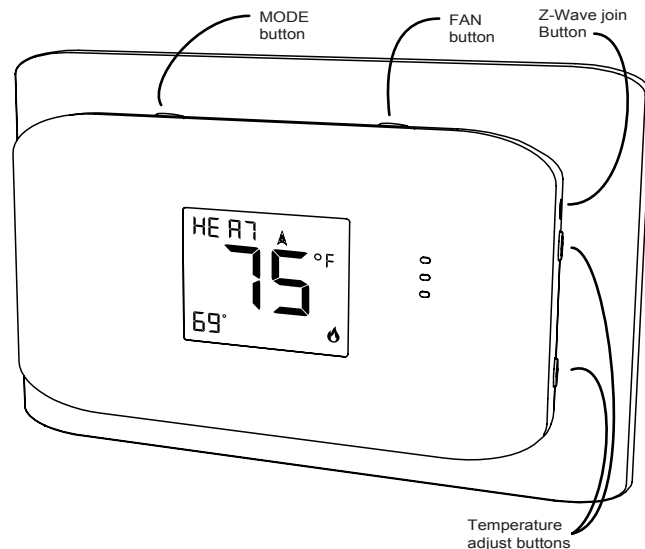


Communicating Thermostat

The CT110 has a built in Z-Wave radio to connect you with a home automation system. This can give you access to your home's HVAC system even when you are away. It can also give you access to web-based efficient energy management sites that can help you save money and protect the environment. Refer to specific instructions that came with your Z-Wave Hub on how to join a device to your Z-Wave network.

Joining a Z-wave network...

1. Press and hold the Z-wave join button (📶) on the CT110 unit! you hear a beep and the radio icon will blink on the CT110.
2. Follow your Hub's directions to join the device to your network.
3. Check to see if the CT110 has joined your network.



Congratulations, you have successfully installed your unit.
Please proceed to the OPERATING Guide to initialize the CT110.

⚠ IMPORTANT: If you have labeled and connected your wires and followed the correct HVAC setup, and your system still does not operate, contact technical support.

STATEMENT OF USE: This thermostat can be used with 24VAC heating and cooling systems and also millivolt heating. It is powered by 4AA batteries, 24VAC (C wire), or 24VAC adapter. It cannot be used with line voltage HVAC systems. This thermostat is digital and your desired heat or cool temperatures can easily be set with the +/- buttons on the right side. In COOL and heat pump operation, an automatic 4 minute off-time protects the compressor from damage.

This thermostat runs on 4AA batteries. The CT110 can be externally powered with a power source rated from 12V to 24V, AC or DC, at 100ma 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.

Step-by-step wiring diagrams

WIRES **C W RH**

2 Wire Heat GAS MILLIVOLT or 24VAC system

STEP 1 - Connect the R (or RH) wire to the RH terminal.

This connects the heat power.

STEP 2 - Connect the W wire to the W terminal.

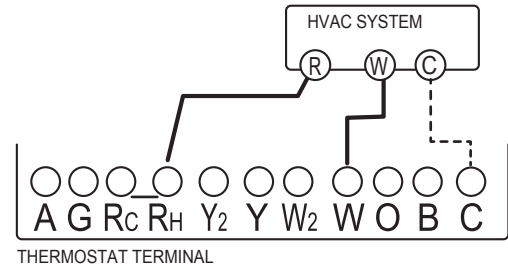
This connects the heat.

STEP 3 - Optional - Connect the C wire to the C terminal.

Your heater is now connected to the CT110.



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WIRES **C W RH G**

3 Wire Heat

STEP 1 - Connect the R (or RH) wire to the RH terminal. This connects the heat power.

STEP 2 - Connect the W wire to the W terminal. This connects the heat.

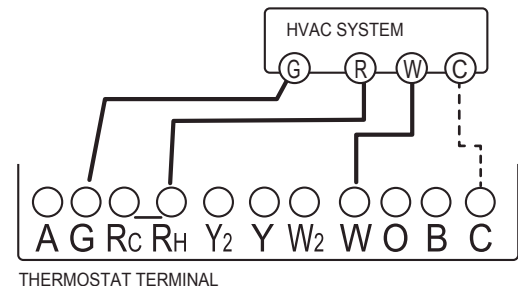
STEP 3 - Connect the G wire to the G terminal on the thermostat. This connects the fan.

STEP 4 - Optional - Connect the C wire to the C terminal.

Your system is now connected to the CT110.



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© W Y RH G 4 Wire Heat/Cool

STEP 1 - Connect the W wire to the W terminal. This connects the heat.

STEP 2 - Connect the Y wire to the Y terminal.

This connects the cooling compressor.

STEP 3 - Connect the RH or R wire to the RH terminal.

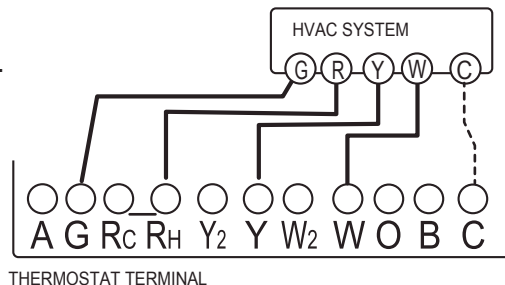
This connects the power.

STEP 4 - Connect the G wire to the G terminal on the thermostat. This connects the fan.

STEP 5 - Optional - Connect the C wire to the C terminal.

Your HVAC system is now connected to the CT110.

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© W Y RH RC G 5 Wire HEAT/Cool

STEP 1 - Connect the W wire to the W terminal. This connects the heat.

STEP 2 - Connect the Y wire to the Y terminal. This connects to the cooling compressor.

STEP 3 - Disconnect the Rc and Rh terminals by removing Rc-Rh jumper wire.

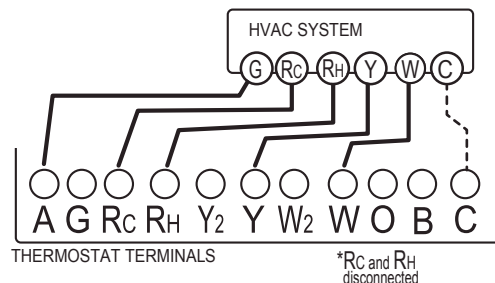
STEP 4 - Connect the RH wire to the RH and the RC wire to the RC terminals. This connects power.

STEP 5 - Connect the G wire to the G terminal. This connects the fan.

STEP 6 - Optional - Connect the C wire from the HEAT to the C terminal.

Your HVAC system is now connected to the CT110.

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Wires C Wn Yn RH G Multi-stage Heat and Multi-stage Cool

The CT110 can handle up to 2 stages of HEAT and 2 stages of COOL.

STEP 1 - Connect the W, W2 wires to the W terminal.

This connects the stages of HEAT.

STEP 2 - Connect the Y and Y2 wires to the Y terminal.

This connects the stages of COOL.

STEP 3 - Connect the RH or R wire to the RH terminal.

This connects the power.

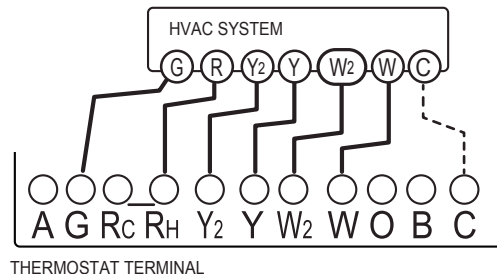
STEP 4 - Connect the G wire to the G terminal.

This connects the fan.

STEP 5 - Optional - Connect the C wire to the C terminal.

Your HVAC system is now connected to the CT110.

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Wires C B or O Y R G 4 Wire Heat Pump (heat/cool) without Auxiliary Heat

STEP 1 - Connect O wire to the O terminal or B wire to the B. 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 under Trane for B wire terminal).

STEP 2 - Connect the Y wire to Y terminal. This connects the compressor.

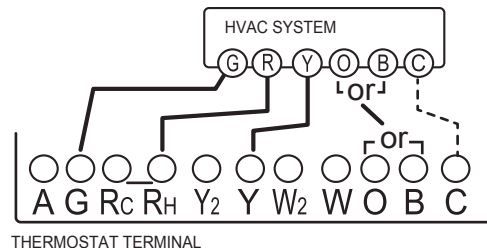
STEP 3 - Connect the R wire to RH. This connects the power.

STEP 4 - Connect the G wire to the G. This connects the fan.

STEP 5 - Optional - Connect the C wire to the C terminal.

Your HVAC system is now connected to the CT110.

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Multi-stage Heat Pump with Multi-stage Aux Heat

The CT110 can handle up to 2 stages of Pump compression and 2 stages of AUX heat.

STEP 1 - Connect O wire to the O terminal **or** B wire to the B. 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 under Trane for B wire terminal).

STEP 2 - Connect the AUX 1, AUX 2, to the AUX 1 and 2 respectively. This connects the auxiliary heat.

STEP 3 - Connect the Y and Y2 wires to the Y terminals respectively. This connects the compressor.

STEP 4 - Connect the R wire to RH terminal. This connects the power.

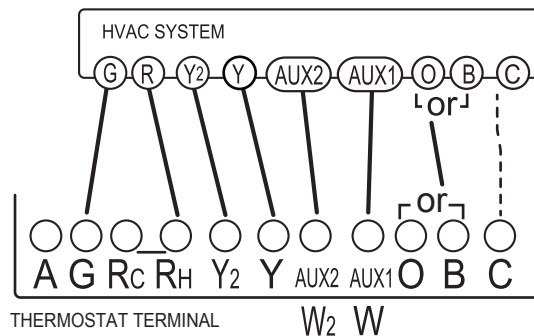
STEP 5 - Connect the G wire to G terminal. This connects the fan.

STEP 6 - Optional - Connect the C wire to the C terminal.

Your HVAC system is now connected to the CT110.



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Wire Reference Table

<i>Possible Wires</i>	<i>What They Control</i>
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 removed)
RC	RC Power for COOL (RH not connected to RC jumper removed)
W / AUX	W Heat control or heat pump auxiliary heat
W2 / AUX2	W2 2nd stage HEAT or 2nd stage of 2 stage auxiliary heat
W3 / AUX3	W3 3rd stage HEAT or 3rd stage of 3 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, 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)

Wire Reference cont.

<i>Possible Wires</i>	<i>What They Control</i>
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 or 2nd stage heat pump auxiliary heat
F or G	G Fan control
R or O	O
X or X2 or C	C

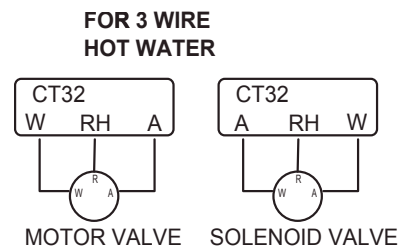
Trane Products [American Standard]	
B	C 24VAC power (to power thermostat)
W or W1	W 1st stage normal HEAT or 1st stage heat pump auxiliary heat
X2	Emergency heat (do not connect, tape off)

Zoned Hot Water Heat -
For Solenoid valve or Motor valve connect the wires based on diagrams below to the correct terminal on the CT110. The third wire on your valve may be called 6, Y, or G.

Your Wires...

2 wire	Thermostat Terminal
R	RH
W	W

3 Wire	
Solenoid Valves	
R	RH (power)
W	A (heat ON)
Y or G (the 3rd wire)	W (heat OFF)



FCC and IC Statemen

FCC Regulatory Information:

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 instruction, 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, the user is encouraged to try and correct

the interference by one or more of the following measures:

- a) reorient or relocate the receiving antenna,
- b) increase the separation between the equipment and receiver,
- c) connect the equipment into 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.

IC Regulatory Information:

This Class B digital apparatus meets all requirements of the Canadian Interference Causing Equipment Regulations. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation of the device. Cet appareillage numérique de la classe B répond a toutes les exigences de l'interférence canadienne causant des rylements d'quipement. L'ypation est sujette aux deux conditions suivantes: (1) ce dispositif peut ne pas causer l'interférence nocive, et (2) ce dispositif doit accepter n'importe quelle interférence re?ue, y compris l'interférence qui peut causer l'opération peu désirée.

WARNING: Changes or modifications to this receiver not expressly approved by RTCOA. could void the user's authority to operate this equipment.

This device complies with Industry Canada's licence-exempt RSSs. Operation is subject to the following two conditions:

(1) This device may not cause interference; and

(2) This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

(1) l'appareil ne doit pas produire de brouillage;

(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.