# MODEL CA8900 Z-Wave® Digital Thermostat

Installation and User Instructions

Description and Features

The CA8900 is a digital thermostat that can be controlled wirelessly with Z-Wave controllers supporting the Thermostat General V2 Device Class. The thermostat is compatible with all standard 24 VAC heating and cooling systems, up to two-stage heat, one-stage cool, and two-stage heat pump. The CA8900 operates as a simple thermostat with buttons to set target temperatures for heat and cool modes. The Save Energy button adds two more modes for target temperatures to provide a single button set-back mode for easy operation. It can easily be retrofitted to existing systems as part of a Z-wave control strategy.

The CA8900 Wireless Thermostat provides two-way communication as part of a Z-Wave® network. When it receives commands from the Central Controller Unit, it sends back confirmation that the command was received and implemented. Each module in a Z-Wave network communicates with every other module, acting as a "repeater" and routing your commands to their destination by the most reliable pathway. When Z-Wave devices (regardless of manufacturer) are installed throughout the house, signals are automatically routed around obstacles or dead spots, strengthening the network as more devices are added. The Z-Wave icon shows on the lower right of the display panel, indicating that the thermostat is in contact with the controller. If the icon is not present, communication has been lost. If this occurs, all remote HVAC functions are shut off.
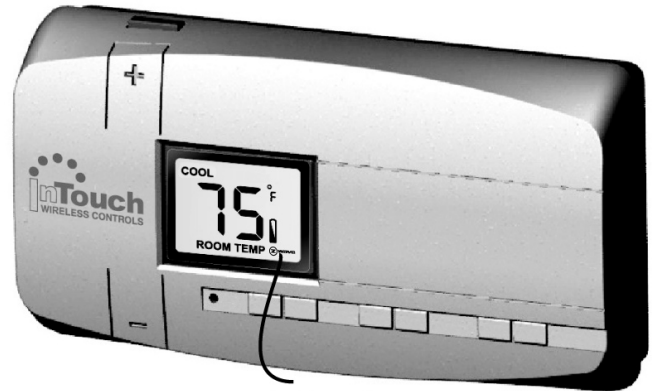
Z-Wave Icon

- This thermostat can be used with all 24VAC heating and cooling systems. It cannot be used with line voltage systems.
- The CA8900 is digital and your desired heat or cool temperatures can easily be set on the large screen with the **TEMP UP (+)** and **TEMP DOWN (-)** buttons on the front.
- A minimum 4-minute off time protects heating and cooling systems from damage.
- This thermostat uses a new technique called sequential staging for more comfort with faster reaction to requested temperature changes.

NOTE: When using a heat pump with auxiliary heat, if the heat pump cannot keep up and/or is defective, remove jumper from position 2B and put jumper on position 2A. This will make the auxiliary heat your only source of heat. Be sure to restore it to PUMP when the pump is again operational, as auxiliary heat is more expensive than pump heat. For more information, see page 3.

This guide is in two parts:

- **Part One: Operating Guide** — for the homeowner or end user.
- **Part Two Installing Guide** — for the installer or technician.

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Part One: Operating Guide

Operating the CA8900

To set the thermostat to control your heating system, press the **HEAT** button so the word HEAT displays. Press again to turn OFF. The word HEAT will flash when the thermostat is calling for heat.

Press the **TEMP UP** and **TEMP DOWN** buttons to select the desired temperature. The word TARGET will be displayed with the temperature you are setting. (The display will return to showing room temperature in 5 seconds.)

To set the thermostat to control your cooling system, press the **COOL** button so the word COOL displays. Press again to turn OFF. The word COOL will flash when the thermostat is calling for cooling.
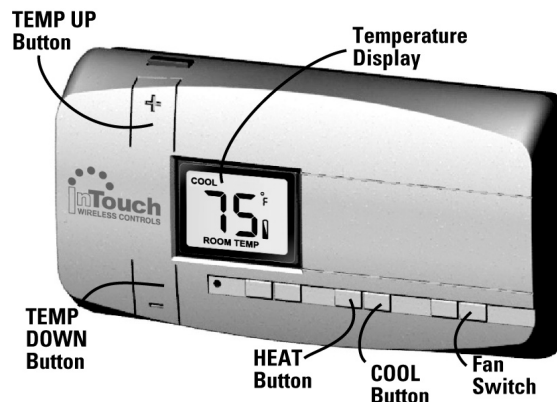

- Slide the fan switch to **AUTO** to automatically run the system's fan during heating and cooling.

- Slide the fan switch to **ON** to run the fan continuously, even without heating and cooling.

Using the SAVE ENERGY Button

The **NORMAL** and **SAVE ENERGY** buttons allow you to quickly switch from the NORMAL programmed target temp to a pre-determined set-back temperature, called the Save Energy temp.

- When in HEAT mode:
  a. Press the **SAVE ENERGY** button. The words SAVE and TARGET appear.
  b. Press the **TEMP UP** or **TEMP DOWN** buttons to set the SAVE ENERGY temperature for heating, or you can accept the default temperature of 65°F. After 5 seconds, the display shows the room temperature and the words SAVE HEAT.

- When in COOL mode:
  a. Press the **SAVE ENERGY** button. The words SAVE and TARGET appear.
  b. Press the **TEMP UP** or **TEMP DOWN** buttons to set the SAVE ENERGY temperature for cooling, or you can accept the default temperature of 80°F. After 5 seconds, the display shows the room temperature and the words COOL SAVE.
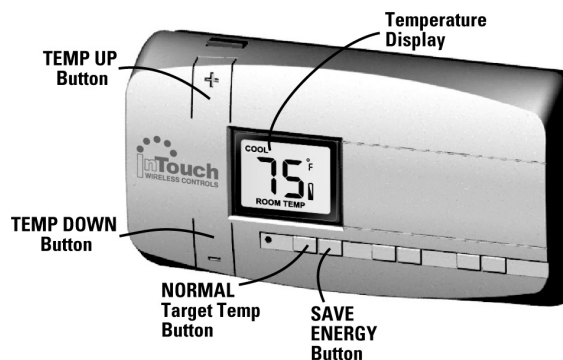
Press the **NORMAL** button to return to the programmed target heat or cool temperature, (depending on which mode you are in). You can press the **TEMP UP** or **TEMP DOWN** buttons to change this target temperature. After 5 seconds, the display shows room temperature.

Joining to a Z-Wave® Network

Bind Button

To join a Z-Wave network, set the Z-Wave controller to INCLUDE mode, then press and release the **BIND** button on the CA8900 thermostat. Follow instructions provided with your controller. You would also use the **BIND** button when excluding from a Z-Wave network.
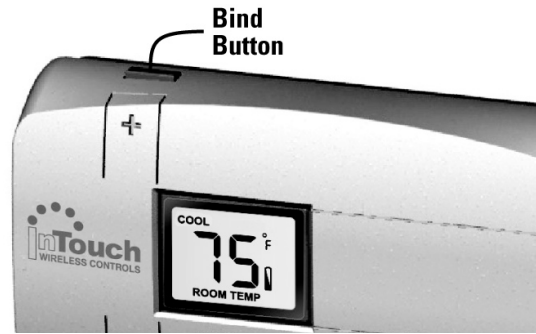
Low Battery Warning

When the batteries are low, the battery icon on the display panel will flash. The two AA batteries in the unit need to be replaced. These batteries are not for operation, but provide battery backup for your settings. The thermostat requires 24VAC for operation, and the HVAC system will stop function if the thermostat loses power.

Replace the batteries as soon as you see the flashing battery icon. Press the RESET button after replacing batteries.

Displaying Fahrenheit or Celsius

Fahrenheit / Celsius Indicator

Current Temperature Display

SET Temperature Display

Whether the temperature display panel displays in Fahrenheit or Celsius depends on the position of the F/C jumper. The F/C jumper is at the top right of the PCB, called Jumper 4 in the diagram below.

• With the jumper removed, the display is in Fahrenheit (the default setting).

• With the jumper placed on both pins, the display is in Celsius (centigrade).

When the jumper is changed, you must press the RESET button on the front of the thermostat.

RESET Button

Celsius/Fahrenheit Jumper
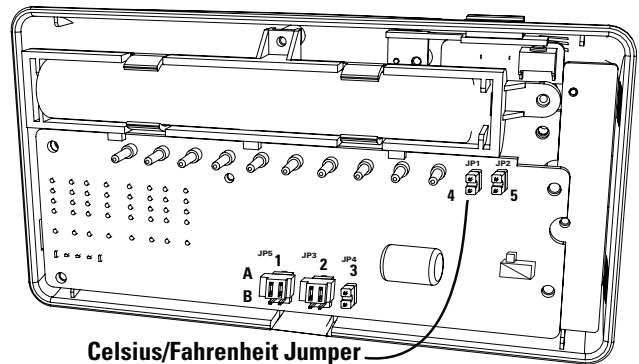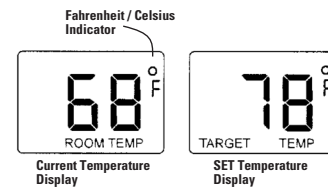
Setting a Heat Pump's AUX ONLY Mode

If you have a heat pump with auxiliary heat and the heat pump is not working or cannot keep up with heat demand, you can use the auxiliary heat only.

Move the jumper from position **2B** [heat pump] to position **2A** [Aux only].

Heat Pump/ Aux Only
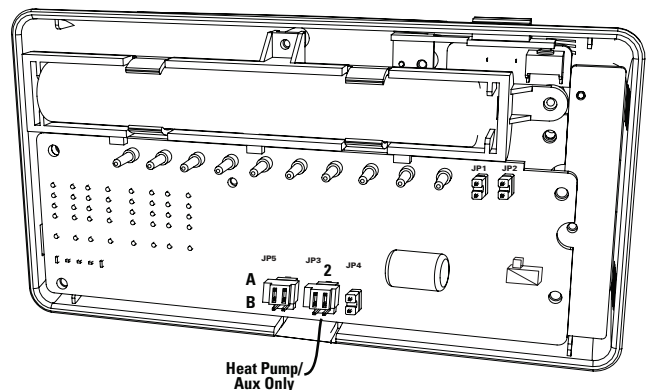
Part Two: Installing Guide

⚠ WARNING–Risk of Fire or Electric Shock

- To avoid fire, shock, or death, 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, or at the appliance.
- Your thermostat is a precise instrument, handle it with care.
- Do not turn electricity back on until work is completed.

- Do not short (jumper) across electric terminals at control on furnace or air conditioner to test the system. This will damage the thermostat and void your warranty.
- All wiring must conform to local codes and ordinances.
- This thermostat is designed for use with 24 volt AC systems. The thermostat should be limited to a maximum of 1.0 amps; higher amperage may cause damage to the thermostat.


Tools Needed

- #1 Phillips screwdriver (small)
- Drill with 3/16-in. (4.8mm) bit

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1 – Location of Thermostat

Replacement installations—mount the new thermostat in place of the old one.

New installations—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,
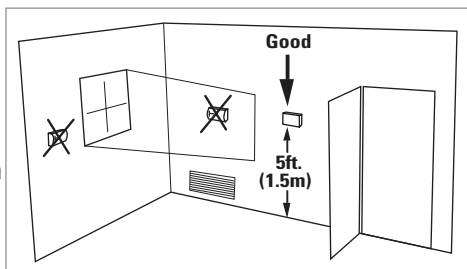

television, radiator register, or fireplace; near hot water pipes in a wall; near a stove on the other side of a wall.

- 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 or an alcove; or behind an open door.
- Do not install the unit until all construction work and painting has been completed.
- This thermostat does not require leveling.

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2 – Label Wires from Old Unit

IMPORTANT : LABEL ALL WIRES BEFORE DISCONNECTING THEM!

Switch electricity to the furnace and air conditioner OFF; then proceed with the following steps.
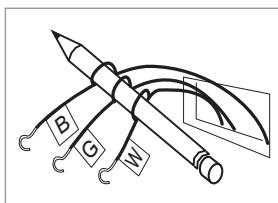
1. Remove cover from old thermostat. Most are snap-on types and simply pull off. Some have locking screws on the side or front. These must be loosened. Note the letters printed near the terminals.

2. Attach labels (enclosed) to each wire for identification.

   NOTE: 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 since these may not comply with any standard.

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3 – Remove Old Unit

1. Label the wires one at a time. You must label all the wires before you proceed.

2. With all wires labeled, remove them from the old unit.

NOTE: Make sure the wires do not fall back inside the wall. You can wind them around a pencil to keep them from falling.

3. Loosen all screws on the old thermostat and remove it from the wall.

4. Fill wall opening with non-combustible insulation to prevent drafts.

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4 – Mount the CA8900 Thermostat

1. Separate front from back of unit. Grasp the thermostat and pry the body away from the base, lift up to remove the body from the base. Set aside the control unit.
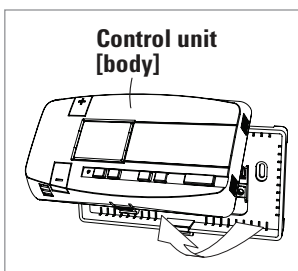
2. Hold the base against the wall, with the wires coming through the opening below the terminal block.

3. Thread wires through the hole in the thermostat base. Take care not to "short" wires.

4. Position the base for best appearance. Mark the holes in pencil for drilling or mount directly to the wall with the two screws provided.

5. If you are mounting the base to drywall or if you are using the old mounting holes, use the plastic anchors provided. Drill a 3/16-in. (4.8mm) hole for the insert at each screw location, and then mount the base.
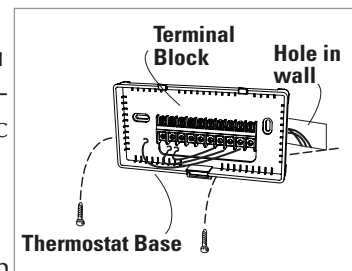
6. Thread wires through the hole in the thermostat base.

7. Leave wires loose in the opening, take care that they do not "short."

Before You Connect Wires

Please follow these guidelines for safe and secure wire connections.

- Use the Step-By-Step diagram as your guide.

- Strip 3/8" of the wire and form as shown

- Take care not to damage the labels for each wire in handling.

- Fan wires out as illustrated with CA8900 below the wall opening.

- Wires will dress behind the CA8900 and up over the terminal area.

- Do not bunch wires behind CA8900. Feed slack back into the wall opening.

- Connect labeled wires only to a terminal with corresponding letter.
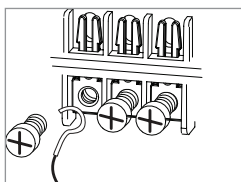
    CAUTION: Do not allow wires to touch each other or parts on thermostat.

- Insert the wire in the terminal and tighten the screw securely.

- You will need to set Configuration Jumpers per the Step-By-Step diagram. A

Jumpers
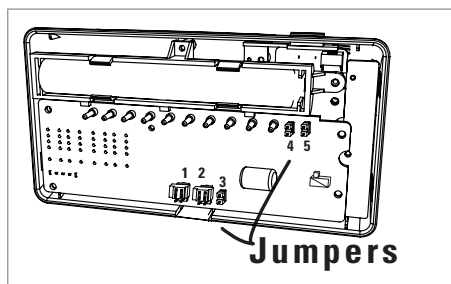
Which wires do you have?

- Determine which step-by-step wiring diagram you should use from the next pages. 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.

- You must have a wire marked "C" (24VAC) for the CA8900 to operate. Without the 24VAC power, the CA8900 will run on its back-up batteries for just a few days.
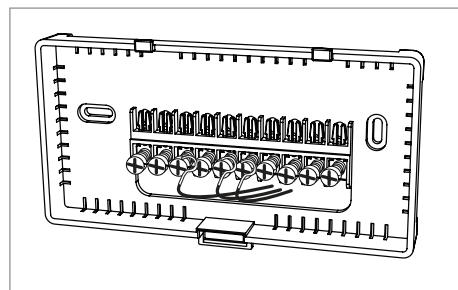
5 – Find and Use the Set-Up Diagram for Your System

Find the reference page with your wiring diagram and jumper set-up information. Remember, the C wire [24vac power] is not optional.

If your combination of wires is not shown here, you can use the Wiring Reference Guide beginning on page 11 to determine your connections, or contact Customer Service for help.
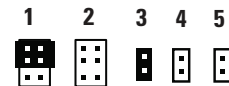
2 WIRE HEAT +C
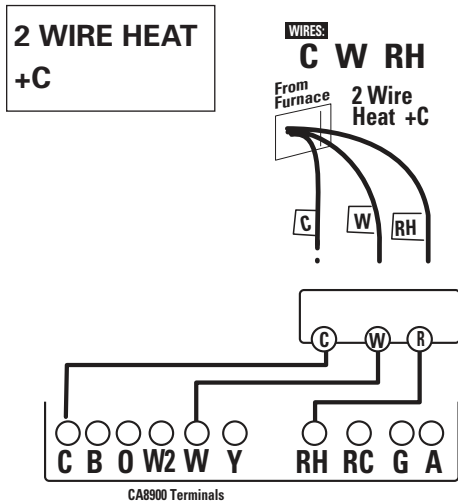
1. Connect the **R** (or **RH**) wire to the **RH** terminal on the CA8900. This connects the Heater Power to the thermostat.
2. Connect the **W** wire to the **W** on the CA8900. This connects the heater control line to the CA8900.
3. Connect the **C** wire to the **C** terminal on the CA8900. This connects 24vac power.
4. Set Config jumpers as shown.
   - If you have Electric heat, set **1A**.
   - If you have Gas or Oil, set **1B**.

Your system is now connected. Continue on page 9.

3 Wire Zoned Hot Water +C
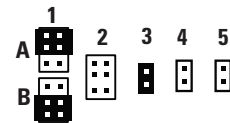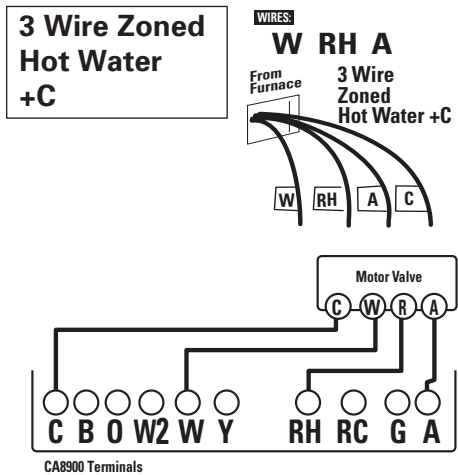
1. Based on your valve type:
   - <u>Motor driven Valve</u> - Connect the **R** (or **RH**) wire to the **RH** terminal on the CA8900. Connect the **W** wire to the **W** terminal on the CA8900. Connect the remaining wire to the A terminal.
   - <u>Solenoid valve</u> -Connect the **R** (or **RH**) wire to the **RH** terminal on the CA8900. Connect the **W** wire to the **A** terminal on the CA8900. Connect the remaining wire to the **W** terminal.
2. Connect the **C** wire to the **C** terminal on the CA8900. This connects 24vac power.
3. Set Config jumpers as shown.

Your system is now connected. Continue on page 9.

3 Wire Heat +C

WIRES:
C W RH G

From Furnace

3 Wire Heat +C

C W RH G

HVAC SYSTEM
C W R G

C B O W2 W Y   RH RC G A
CA8900 Terminals

1. Connect the **R** (or **RH**) wire to the RH terminal on the CA8900. This connects to the Heater Power.
2. Connect the **W** wire to the **W** terminal on the CA8900. This connects the heater control line to the CA8900.
3. Connect the **G** wire to the **G** terminal on the thermostat. This connects the Fan to the CA8900
4. Connect the **C** wire to the **C** terminal on the CA8900. This connects 24vac power.
5. Set Config jumpers as shown.
   - If you have Electric heat, set **1A**.
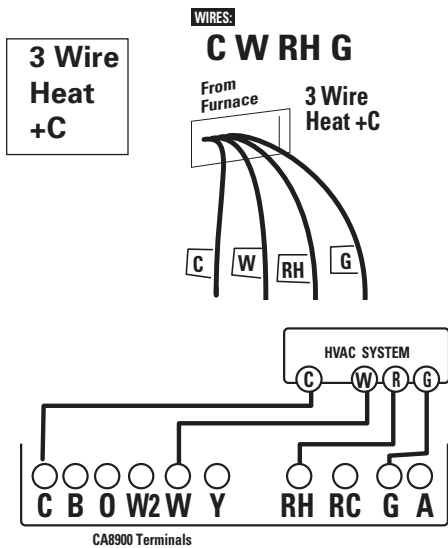   - If you have Gas or Oil, set **1B**.
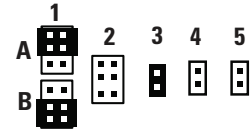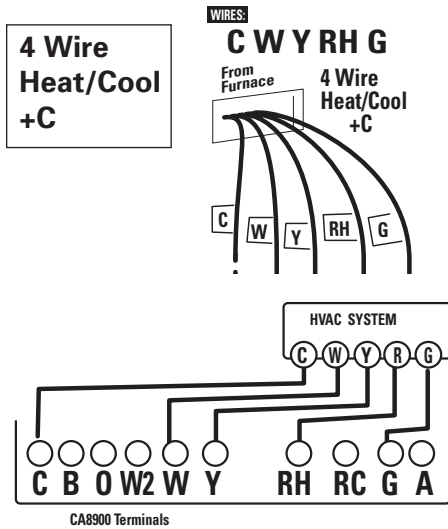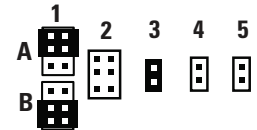
1
A   2 3 4 5
B

Your system is now connected.
Continue on page 9.

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4 Wire Heat/Cool +C

WIRES:
C W Y RH G

From Furnace

4 Wire Heat/Cool +C

C W Y RH G

HVAC SYSTEM
C W Y R G

C B O W2 W Y   RH RC G A
CA8900 Terminals

1. Connect the **W** wire to the **W** terminal on the thermostat. This connects to the heater control line.
2. Connect the **Y** wire to the **Y** terminal on the CA8900. This connects to the Cool compressor.
3. Connect the **RH** or **R** wire to the **RH** terminal on the thermostat. This connects the Heater/Cool Power.
4. Connect the **G** wire to the **G** terminal on the Thermostat. This connects to the Fan.
5. Connect the **C** wire to the **C** terminal on the CA8900. This connects 24vac power.
6. Set Config jumpers as shown.
   - If you have Electric heat set **1A**.
   - if you have Gas or Oil set **1B**.

1
A   2 3 4 5
B

Your system is now connected. Continue on page 9.

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5 Wire Heat/ Cool +C

WIRES:
C W Y RH RC G

From Furnace

5 Wire Heat/Cool +C

C W Y RH RC G

HVAC SYSTEM
C W Y RH RC G

C B O W2 W Y   RH RC G A
CA8900 Terminals

1. Connect the **W** wire to the **W** terminal on the thermostat. This connects to the heater control line.
2. Connect the **Y** wire to the **Y** terminal on the CA8900. This connects to the Cool compressor.
3. Connect the **RH** wire to the **RH** terminal and the **RC** wire to the **RC** terminal on the CA8900. This connects the Heater and Cool Power.
4. Connect the **G** wire to the **G** terminal on the Thermostat. This connects to the Fan.
5. Connect the **C** wire to the **C** terminal on the CA8900.This connects 24vac power.
6. Set Config jumpers as shown.
   - If you have Electric heat set **1A**.
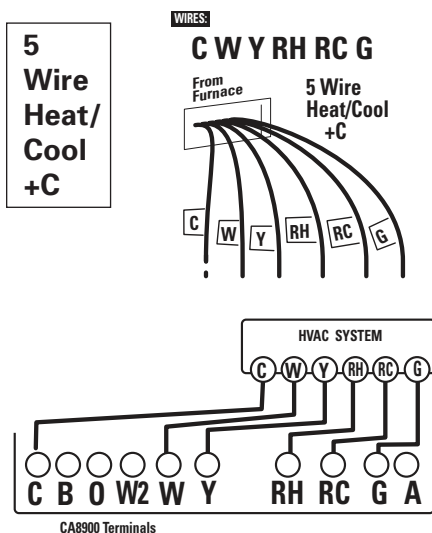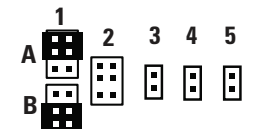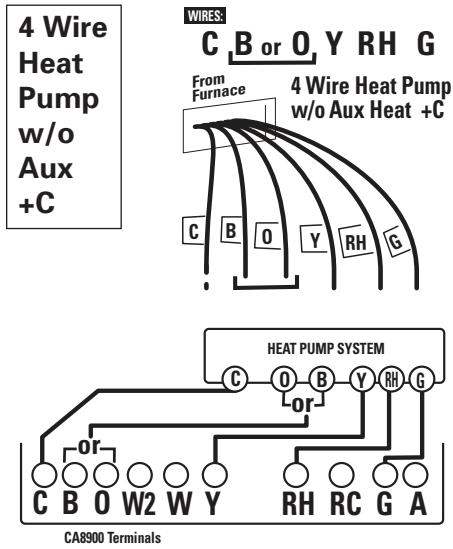   - If you have Gas or Oil set **1B**.

1
A   2 3 4 5
B

Your system is now connected. Continue on page 9.

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4 Wire Heat Pump w/o Aux +C

WIRES:
C B or O Y RH G

From Furnace

4 Wire Heat Pump w/o Aux Heat +C

C B O Y RH G

HEAT PUMP SYSTEM

C O B Y RH G
      or

or

C B O W2 W Y   RH RC G A

CA8900 Terminals

1. Connect **O** wire to the **O** terminal or **B** wire to the **B** terminal on the CA8900. (If you have both **O** and **B**, connect **O** wire to **O** terminal

    *DO NOT connect **B** to **B** terminal. (See page 10 Trane for the **B** wire terminal.) This connects the change-over valve.*

2. Connect the **Y** wire to **Y** on the CA8900. This connects the Compressor.

3. Connect the **R** (or **RH**) wire to **RH** on the CA8900. This connects to the 24vac power.

4. Connect the **G** wire to the **G** terminal on the CA8900. This connects the Fan.

5. Connect the **C** wire to the **C** terminal on the CA8900. This connects 24vac power.

6. Set Config jumpers as shown.

   1   2   3   4   5

Your system is now connected. Continue on page 9.

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5 Wire Heat Pump w/ Aux Heat +C

WIRES:
C B or O W2 Y R H G

From Furnace

5 Wire Heat Pump w/ Aux Heat +C

C B O W2 Y RH G

or

HEAT PUMP SYSTEM

C O B W2 Y R G
      or

or
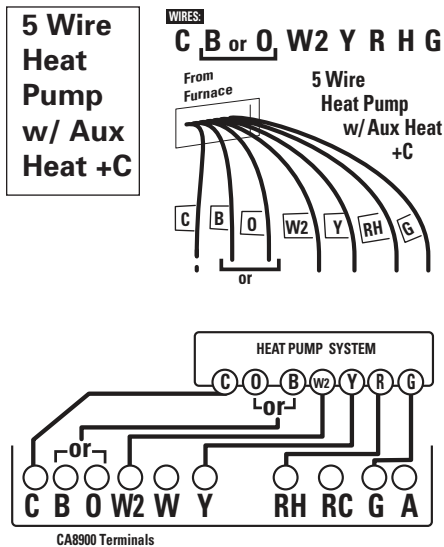
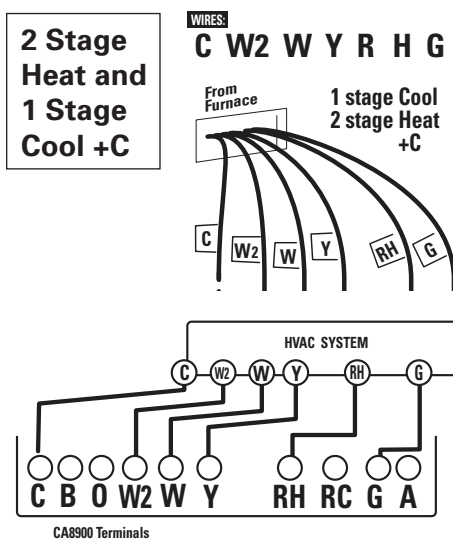C B O W2 W Y   RH RC G A

CA8900 Terminals

1. Connect **O** wire to the **O** terminal or **B** wire to the **B** terminal on the CA8900. If you have both **O** and **B**, connect **O** wire to **O** terminal.

    *DO NOT connect **B** to **B** terminal. See page 10 Trane for **B** wire terminal.*

2. Connect the **W2** wire to **W2** on the CA8900.

3. Connect the **Y** wire to **Y** on the CA8900.

4. Connect the **R** wire to **RH** on the CA8900.

5. Connect the **G** wire to **G** on the CA8900.

6. Connect the **C** wire to the **C** terminal on the CA8900. This connects 24vac power.

7. Set Config jumpers as shown.

8. Set jumper 5 if you have Gas or Oil aux heat.

   1   2   3   4   5

Your system is now connected. Continue on page 9.

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2 Stage Heat and 1 Stage Cool +C

WIRES:
C W2 W Y R H G

From Furnace

1 stage Cool 2 stage Heat +C

C W2 W Y RH G

HVAC SYSTEM

C W2 W Y RH G

C B O W2 W Y   RH RC G A

CA8900 Terminals

1. Connect the **W** wire to the **W** terminal and **W2** to **W2** on the CA8900. This connects 2 stages of heat.

2. Connect the **Y** wire to the **Y** terminal wire on the CA8900. This connects cool.

3. Connect the **RH** or **R** wire to the **RH** terminal on the thermostat. This connects the Heater/Cool Power.

4. Connect the **G** wire to the **G** terminal on the Thermostat. This connects to the Fan.

5. Connect the **C** wire to the **C** terminal on the CA8900. This connects 24vac power

6. Set Config jumpers as shown.

   - If you have Electric heat, set **1A**.

   - If you have Gas or Oil, set **1B**.

   1   2   3   4   5
   A
   B

Your system is now connected. Continue on page 9.

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6 – Install AA Batteries

While the CA8900 requires the C wire (24VAC) to operate. It also requires 2AA batteries to back-up the 24VAC power for up to a few days.

1. Install 2 AA alkaline batteries according to the polarity noted in the compartment. LCD segments will go on.

2. Press the **RESET** button (on front of the thermostat) to clear transient program memory.

   NOTE: Replace the batteries when this LOW battery indicator appears on the display or once a year.
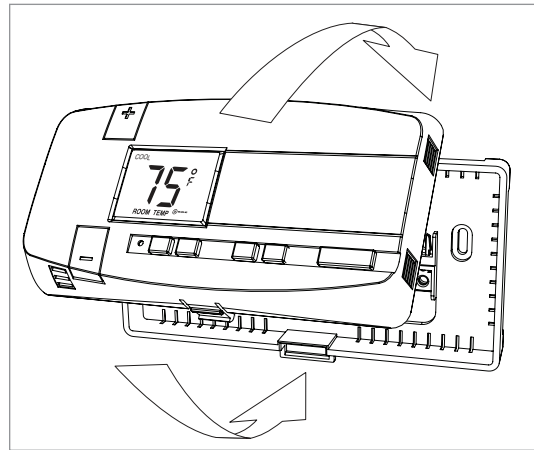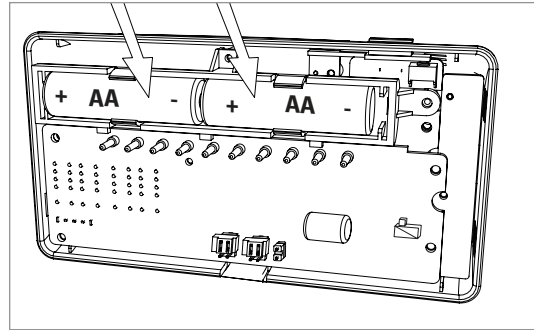
When you have finished inserting the batteries:

1. Attach control unit to wall unit.
2. Hook the top of the body onto the base.
3. Swing the body down, and
4. Snap the body onto the base.

7 – Check Out the CA8900 Unit

Follow these procedures to verify you have correctly installed the CA8900.
Turn power to the system back on.

**To check Fan: (If you connected the G wire – fan relay)**
1. Slide the **FAN** switch to the **ON** position.
2. Verify that air is blowing from the system.
3. Return to AUTO position for normal operation.

To check HEAT mode:
1. Press **HEAT** button, setting the mode to **HEAT**. The word HEAT displays.
2. Slide the **FAN** switch to **AUTO**.
3. Using the **TEMP UP (+)** button, raise the Target Temp to 90° F.
4. Allow the system 2 min to respond.
5. Verify that heat is blowing from the system.
6. Press the **HEAT** button to shut heat off.

To check COOL mode:
1. Press the **COOL** button, setting the mode to **COOL**. The word COOL displays.
2. Slide the **FAN** switch to **AUTO**.
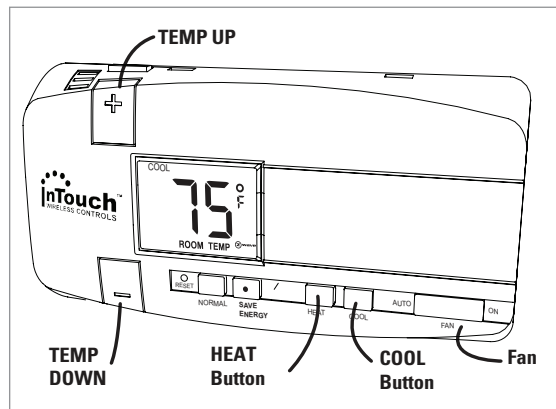
3. Press the **TEMP DOWN (–)** button to a temp 5 degrees below the room temp.
4. Allow the system 2 minutes to respond.
5. Verify that cool air is blowing from the system.
6. Press the **COOL** button to shut cooling off.

Congratulations, you have successfully installed your unit.
Please proceed to the OPERATING Guide to initialize the CA8900.

NOTE: If you have labeled your wires, followed the correct Step-By-Step, and these Check procedures do not operate your system, call Customer Support.

Power Requirement

24VAC Required!

This thermostat must run on the HVAC 24VAC (C) wire.

As shown in the wiring diagrams, the 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. With the C wire connected, the thermostat will continue to work if the batteries die or are removed. The batteries are for back-up in case of power loss and only will last a few days. In case of total power loss the NORMAL and SAVE energy settings will return to their default settings (see operation guide) when power is reapplied.

Changing Calibration

Your thermostat comes from the factory calibrated to +/- 1 degree of actual temperature. It is an accurate instrument. If you want your thermostat to display the same temperature as another thermometer in your home, you can adjust its calibration.

To change the calibration:

1. Remove the top cover.

2. Locate the **Calibration** switch and slide it to the ON position. The current calibration factor **(+/-)** of the CA8900 will appear in the LCD display.

3. Push the **UP** or **DOWN** arrows until the desired calibration factor is reached.

4. Slide the **Calibration** switch to the OFF position. The new calibrated temperature will be displayed on the LCD.

OFF   ON

Calibrate switch
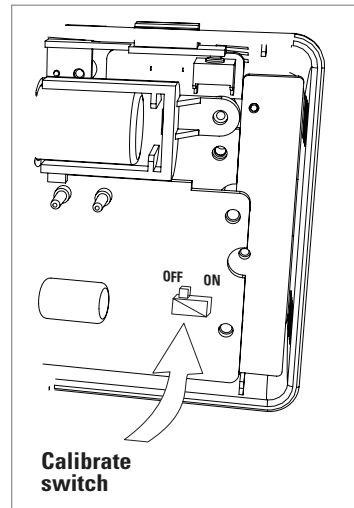
Wire Reference Guide

Your Wires	Intermatic Terminal
R or V or V	R RH and RC Single power for HEAT and COOL
RH or 4	RH Power for HEAT (RH not connected to RC)
RC	RC Power for COOL (RH not connected to RC)
W	W Heat control
W2	W2 2nd stage HEAT or heat pump auxiliary heat
?	A 3rd wire for zoned hot water heat (see zoned)
Y	Y COOL control
Y2	2nd stage COOL control (do not connect; tape off)
G or F	G FAN control
C or X	C Common 24VAC power (to power thermostat)

Lennox Heat Pump

Your Wires	Intermatic Terminal
V or VR or R	RH
M or Y	Y
Y or W or W2	W2
F or G	G
R or O	O
X or X2 or C	C

Trane Products (Amer Std)

Your Wires	Intermatic Terminal
B	C
W or W1	W2

Your Wires	Intermatic Terminal
E	Emergency heat (do not connect, tape off)
L	System monitor (do not connect, tape off)
T	Outdoor sensor (do not connect, tape off)
B or	B Heat pump changeover (cool to heat, powered in heat)
O	O Heat pump changeover (heat to cool, powered in cool)
B and O	If there are both B and O wires (Trane pump products). **DO NOT CONNECT B to B terminal, connect B to C terminal.**

Zoned Systems

Your Wires	Intermatic Terminal
2 wire Zoned Hot Water	
R	RH
W	W
3 Wire Zoned Hot Water Motor Driven Valves	
R	RH
W	W
Y (the 3rd wire)	A
3 Wire Zoned Hot Water Solenoid Valves	
R	RH
W	A
Y (the 3rd wire)	W

Jumper Reference
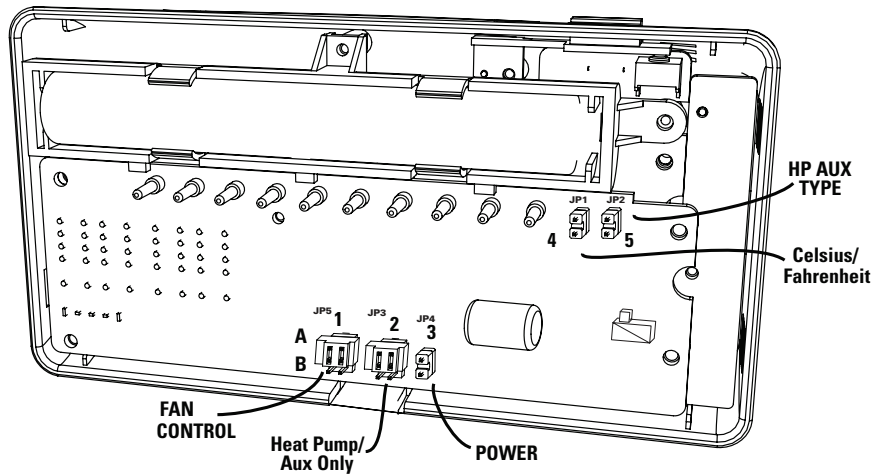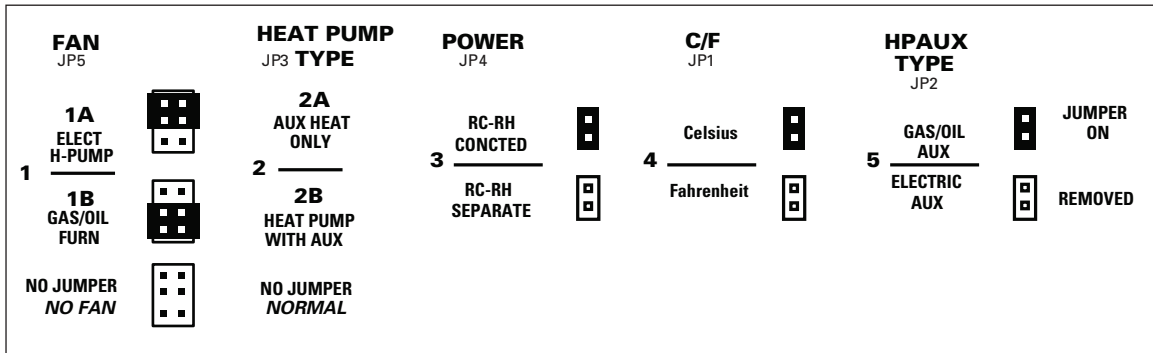
LIMITED ONE-YEAR WARRANTY

If within one (1) year from the date of purchase, this product fails due to a defect in material or workmanship, Intermatic Incorporated will repair or replace it, at its sole option, free of charge. This warranty is extended to the original household purchaser only and is not transferable. This warranty does not apply to: (a) damage to units caused by accident, dropping or abuse in handling, acts of God or any negligent use; (b) units which have been subject to unauthorized repair, opened, taken apart or otherwise modified; (c) units not used in accordance with instructions; (d) damages exceeding the cost of the product; (e) sealed lamps and/or lamp bulbs, LED's and batteries; (f) the finish on any portion of the product, such as surface and/or weathering, as this is considered normal wear and tear; (g) transit damage, initial installation costs, removal costs, or reinstallation costs.

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This warranty service is available by either (a) returning the product to the dealer from whom the unit was purchased, or (b) mailing the product, along with proof of purchase, postage prepaid to the authorized service center listed below. This warranty is made by: Intermatic Incorporated/After Sales Service/7777 Winn Rd., Spring Grove, Illinois 60081-9698/815-675-7000 http://www.intermatic.com Please be sure to wrap the product securely to avoid shipping damage.

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