ZEN

ZEN THERMOSTAT™
INSTALLER GUIDE

VERSION 1.0 | 13 March 2015

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CONTENTS

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INTRODUCTION TO THE ZEN THERMOSTAT

ZEN is a new home thermostat that looks beautiful on your wall, is incredibly simple to use and is connected to the Internet so you can control the temperature of your home from your home automation system.

SMART DOESN'T HAVE TO BE COMPLEX

ZEN has no ugly push buttons. Instead we have replaced them with an elegant touch screen which is simple and intuitive and fades into the background when you're not using it. Instead of screws, ZEN uses magnets to click on and off the wall.
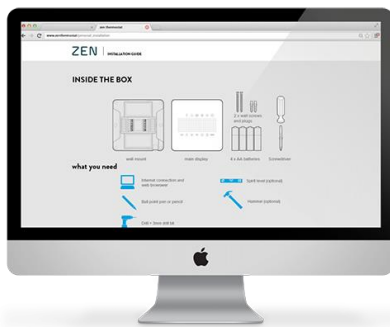
INSTALLATION IS SIMPLE TOO

We believe that simple design is good design. So while it was tempting to just keep adding features, what we realised was that most people just want a beautiful thermostat that is simple to install and easy to use.

The ZEN team devoted as much effort in making the installation process simple and intuitive as they spent on the styling and everyday usage

ZEN FOCUSES ON WHAT REALLY MATTERS, SETTING THE TEMPERATURE OF YOUR HOME RIGHT

We looked at how people use thermostats and we found that complicated units with embedded learning algorithms don't really work the way people expect. You can spend a lot of time correcting the assumptions it's made about you. We wanted to avoid this. We didn't want to create a thermostat that thinks it's smarter than you. We wanted you to only interact with ZEN when you really need to.

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ZEN Thermostat Technical Specifications

Design

User input	Touch interface
Display	LED Matrix
Wall mounting	Mounting bracket with magnetic connection to main body
Colour	White body with White display

Setup and Installation

HVAC system rating	24V AC (nominal)
	2A max per relay
Battery Life	2 years (on 4 x AA batteries, with typical use)
	Continuous operation if a C-wire is connected
Installation Manuals	Paper-based quick-start guide
	Web-based system setup and wiring guide
Display Language	English, French, Spanish

System Control

HVAC system rating	24V AC (nominal)
	2A max per relay
Battery Life	2 years (on 4 x AA batteries, with typical use)
	Continuous operation if a C-wire is connected
Installation Manuals	Paper-based quick-start guide
	Web-based system setup and wiring guide
Display Language	English, French, Spanish

Connectivity

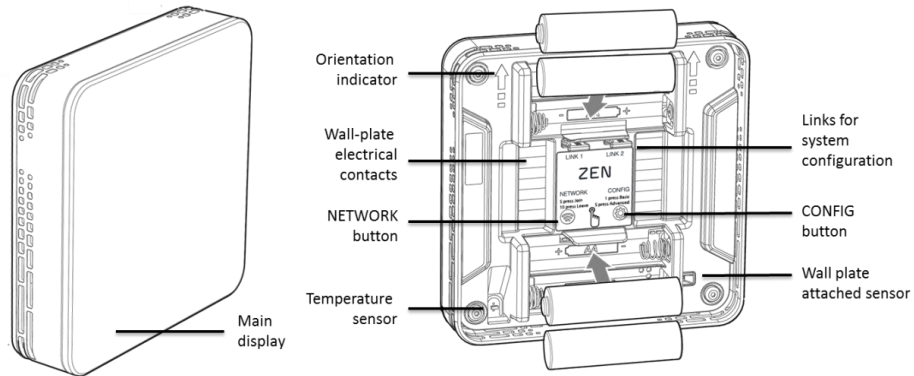|	
Wireless protocols	ZigBee HA1.2 compatible
	OpenHome approved
Firmware upgrade	Over-the-air (OTA) upgrade

HVAC system compatibility

Heating System Types	Forced Air, Heat pump, Gas, Electric, Millivolt, Hydronic
Heating stages	1 or 2, plus emergency heat
Cooling Systems	Heat pump, Evaporative, Hydronic
Cooling stages	1 or 2
Heatpump support	Two-stage reversible heatpump (with Auxillary/Emergency Heat)

Package Contents

ZEN Thermostat Display
Wall-mounting plate
4 x AA batteries
Mounting hardware
Instruction manual
Wall blanking plate

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ZEN Thermostat Features

Display

Orientation indicator

Wall-plate electrical contacts

NETWORK button

Temperature sensor

Main display

Links for system configuration

CONFIG button

Wall plate attached sensor

Wall Plate

Magnet to attach main display

Orientation indicator

Hole for HVAC wiring bundle

Terminal labels (both sides)

Wall plate attached sensor pin

Wire terminals

Mounting holes

Wall-plate electrical contacts

Temperature sensor cover

Mounting Hardware

Wall anchors (plaster and masonry)

Mounting screws

Wall blanking plate

Mounting holes for portrait orientation (both sides)

Hole for HVAC wiring bundle

Mounting holes for landscape orientation (both sides)

Locating feature for wall plate

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User Interface Guide

User Interface Touchscreen

Confirm | Increase temperature

Change mode

Change mode

Decrease temperature
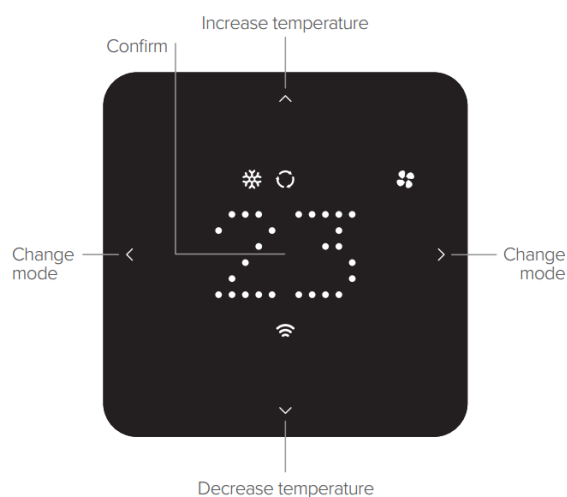
BASIC OPERATION

Center touch to wake. ZEN shows current ambient temperature.

Center touch again. ZEN shows current set point temperature.

Touch left or right to select operating modes. Center touch to confirm your selection.

Touch up or down to change the set point temperature. Center touch to confirm your selection.

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Operating Modes

ZEN Thermostat supports setting the following operating modes via the thermostat display:

- HEAT, COOL, OFF, EMER (emergency heat)
- FAN AUTO or FAN ON
- AUTO (not available by default, must be enabled in advanced settings)

The ZEN user interface automatically adjusts to only show the operating modes that are available for the wiring and HVAC configuration (see later section on ZEN HVAC Configuration for details).

Other functions such as scheduling, economy modes or demand response are controlled through the home automation platform using a touchscreen or smartphone app.
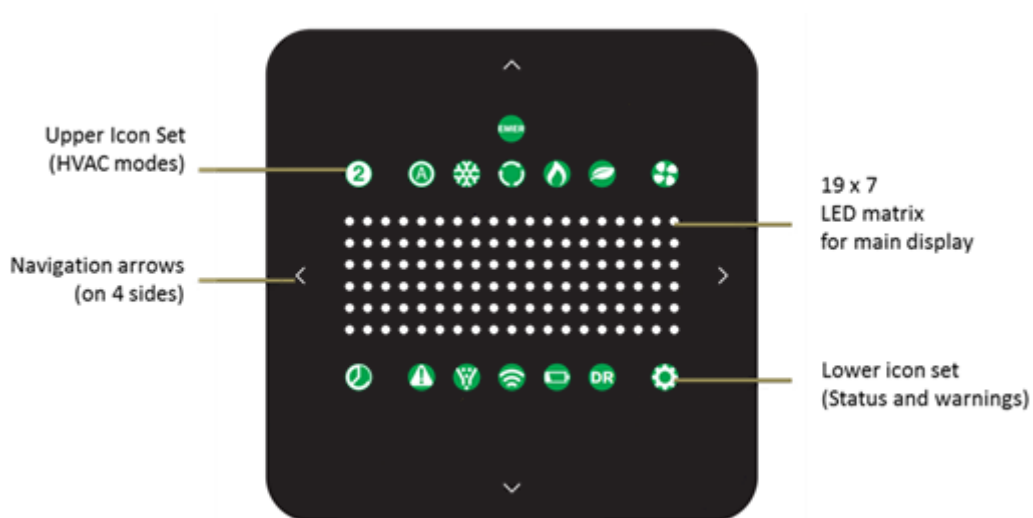
Icon meanings

ICON GUIDE

Status			
📶	Network Connected	❷	Second stage heating or cooling
↻	Active	EMER	Emergency heating
🔥	Heating Mode	DR	Demand response event in progress
❄	Cooling Mode	🍃	Eco mode
✾	Fan On Continuous	🕐	Schedule Mode
Ⓐ	Auto Mode	⚙	Preferences Mode

Warning			
🔋	Battery Low	⚠	Error
⩗	Filter Change Required		

Some modes may not be enabled by your home automation provider.

LED Display Details

Upper Icon Set (HVAC modes)

Navigation arrows (on 4 sides)

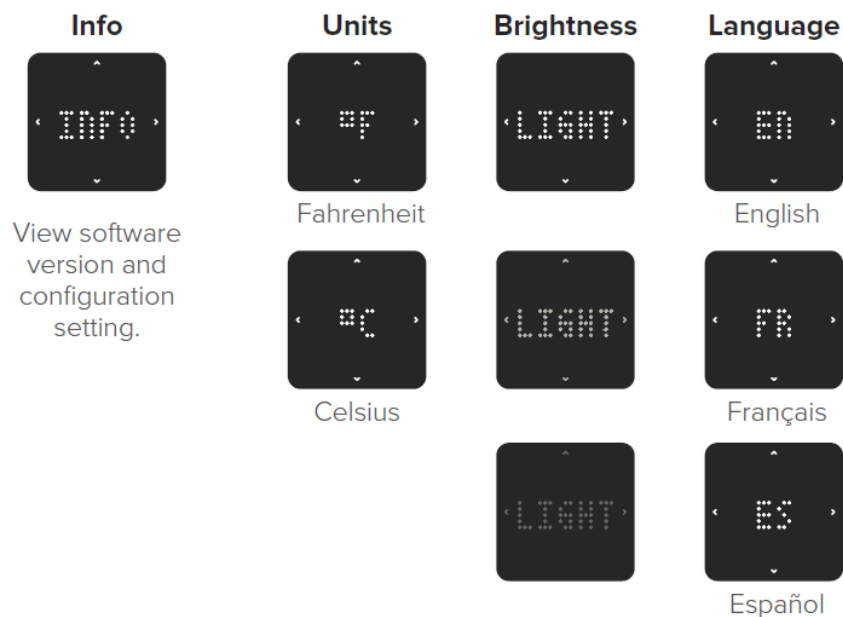19 x 7 LED matrix for main display

Lower icon set (Status and warnings)

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User Preferences

Access the user preferences by removing the unit from the wall

- Center touch to activate options.
- Touch right or left to scroll through the preferences.
- Touch up or down to modify a preference.
- Center touch to confirm.

Info	Units	Brightness	Language
‹ INFO ›	‹ °F ›	‹ LIGHT ›	‹ EN ›
View software version and configuration setting.	Fahrenheit	English
	‹ °C ›	‹ LIGHT ›	‹ FR ›
	Celsius		Français
		‹ LIGHT ›	‹ ES ›
			Español

Rebooting or Resetting to Factory Defaults

If you are experiencing issues, reboot your display by removing and reinserting a battery. This will retain your configuration settings.

Performing a Factory Reset will reset your HVAC system configuration and all of your preference and advanced settings changes. You should only do this when instructed by a support center assistant.

To restore to factory settings, press the CONFIG button on the back of the main display 20 times. The display will beep five times to confirm the reset.

## Cleaning and Maintenance

Clean with a damp cloth only.

Avoid using chemical cleaning agents.

8

ZEN Thermostat Online Install Guide

The ZEN thermostat is designed to be installed by DIY customers and HVAC installers. The ZEN online installation guide (www.zenthermostat.com/install) should be the first point of call for any installation. It provides step-by-step instructions for installing and configuring ZEN, which are customised to the specific wiring configuration of the user.

Complex or Unusual Installations

The ZEN Online Installation Guide works for over 90% of install situations. However, if a wiring combination is not recognised, the user is notified.
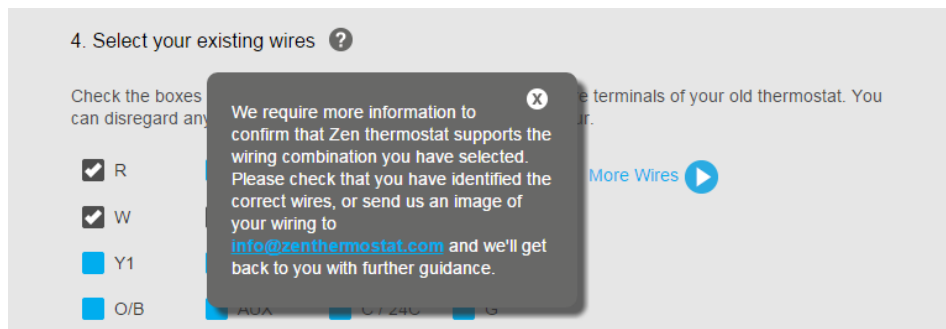
The next steps are:
1. User provides more information to support centre via email. An image of the existing thermostat wiring is very valuable.
2. Support centre responds with:
   o Advice on how to wire up the ZEN thermostat and which configuration code to use
   o If the installation is complex, a recommendation to call a HVAC technician.
   o If the installation is not compatible with ZEN, a recommendation to return ZEN to the place of purchase

⚠️ **If there is any uncertainty about the configuration, ZEN recommends calling a HVAC technician**

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ZEN Installation Tips and Tricks

Precautions and safety

As with all electrical equipment, the first step in installation should be to turn off the main breaker

The ZEN thermostat works on low voltage systems rated at 24 volts, with a maximum current rating of 2A per relay. This is the common voltage for most furnaces, heat pumps and air conditioning systems.

ZEN will not work on line voltage systems of 110 volts or higher. These systems are typically European systems or electric baseboard systems.

If the wiring is installed in a junction box, it is also likely to be 110V or higher.

Usually, these systems will have thick black, white or red wires connected with wire nuts on the thermostat.

If the HVAC system is not compatible with ZEN, please return ZEN to the place of purchase.

⚠ **WARNING** ◇
Extra Low Voltage only.
Do not connect to mains voltages.

ZEN
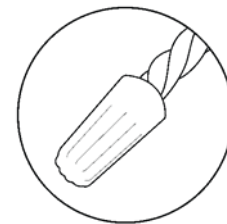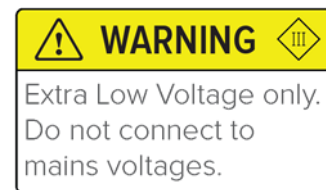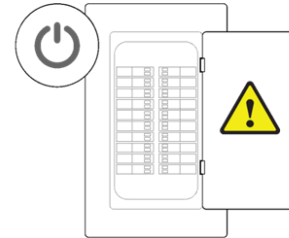
Removing the existing thermostat main display

Most thermostats allow you to remove the main unit and provide access to a wall plate which holds the wiring terminals
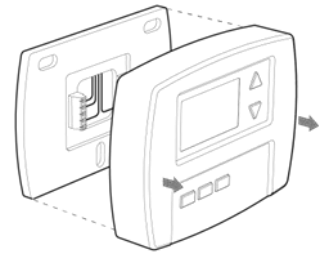
Removing the existing thermostat differs between models. It usually requires:

- snapping it off the wall with moderate pressure
- undoing small screws
- lifting locking tab and rotating the thermostat

If you are unable to pull it off, please refer to your thermostat manufacturer's website or manual for removal instructions.

⚠️ Some old thermostats contain mercury in a sealed tube. Contact the Thermostat Recycling Corporation at http://www.thermostat-recycle.org/ for information on how and where to properly and safely dispose of your old thermostat.

Wire labelling

There is no single standard for wire colours and thermostat connections. However, most thermostats have terminal blocks with wire labels.

The way in which the old thermostat is wired and labelled is one of the best guides for how to wire up the ZEN thermostat. Correctly identifying the wires that exist ensures that all the functions of your heating and cooling system will be able to be controlled by the ZEN thermostat.

If you are unsure or your wire terminals are unlabelled, tracing the wires back to the HVAC system is the best way to determine what each wire does.

ZEN provides wire labels in the package, which should be used to label the wire before they are removed from the old thermostat terminals.

R_H	R_H	Y_1	Y_1
R_C	R_C	Y_2	Y_2
O/B	O/B	G	G
AUX	AUX	W_1	W_1
C	C	W_2	W_2

The ZEN online installation guide provides a detailed description of which label should be applied to which wire.

Once the old thermostat is removed, the best way of identifying wires is through the ZEN labels.

The wiring diagrams provided by ZEN are all based on the ZEN labelling format

R = R_H

O/B = O/B
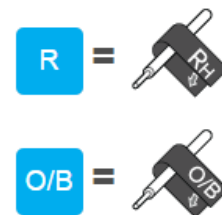
The basic connectors for a home thermostat can be found in the table below:

Terminal	Description	Alternate labelling
R	Power side of 24V transformer	V
Rh	Power side of 24V heating switch	4
Rc	Power side of 24V cooling switch	
C	Common side of 24V	24C, 24
Y	Switched power for cooling	Y1
W	Switched power for heating	W1
G	Switched power for fan	
Y2	Switched power for second stage cooling	
W2	Switched power for second stage heating	
E	Emergency heat enable	AUX
O/B	Reversing valve activatoin	O,B

Wire preparation and insertion

Disconnecting the wires from the existing thermostat may require a screwdriver to undo the terminals.

Once removed, it is important to check that the wires are in good condition so that they make good electrical contact.

Check wires have between 5/16 - 3/8in (8-10mm) exposed core. If they don't, you may need to cut and re-strip them.

If you have stranded wire, ensure that all strands are safely captured in the terminal.

If the installation guide has specified that some wires should not be connected, ensure that they are properly insulated.


5/16 - 3/8in
(8-10mm)
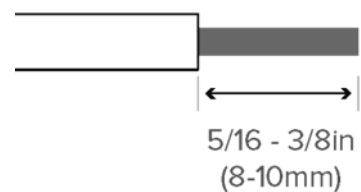
Link removal and insertion

Many thermostats use links to connect common circuits together.

ZEN does not require re-use of old links. It comes complete with 2 links, which are located on the rear of the main unit.

The links can be removed by pulling gently and inserted by pushing them into place.

Configuration of the links is determined based on the information entered into the online install guide. The function of each link configuration is shown below:
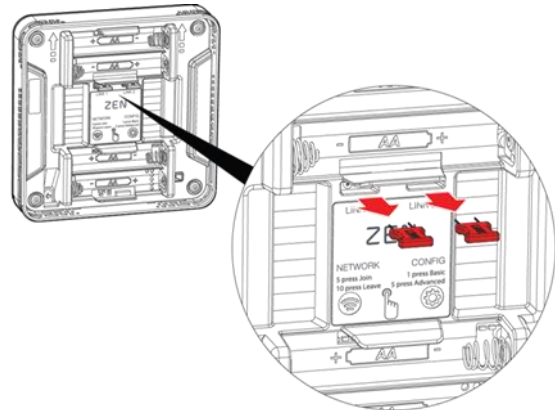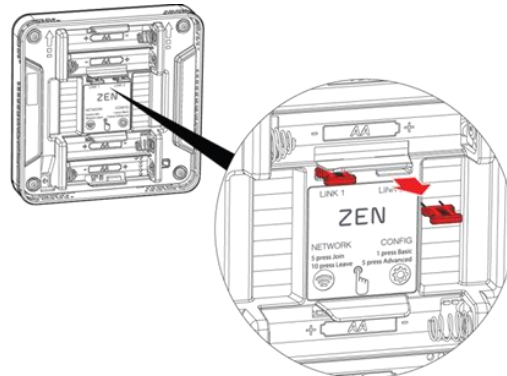
Link 1 and Link 2

- Rc and Rh connected to common return

- Aux connected to same return as Rh

- Applies to most single stage systems and heatpump systems
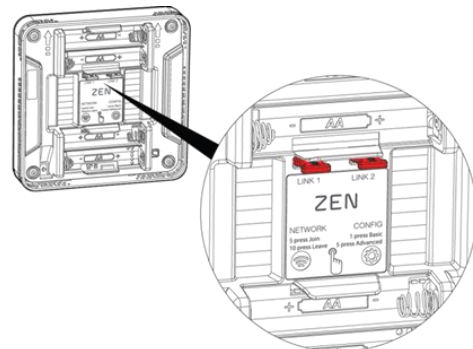
Link 1 only

- Rc and Rh on separate return circuits

- Aux connected to same return as Rh

- Applies to systems which have separate heating and cooling equipment

Link 2 only

- Rc and Rh connected to a single return circuit

- Aux connected to separate return circuit

- Applies to most heatpump systems where the auxiliary heat system is separate equipment
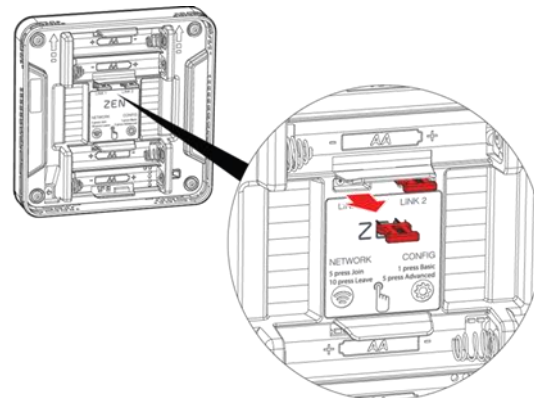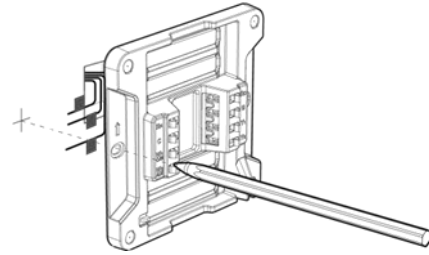
No links

- This configuration is never used
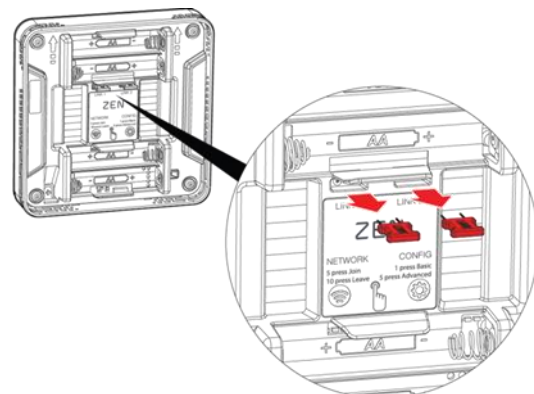
Mounting the ZEN wallplate

The ZEN wallplate should be mounted so that the bundle of wires comes out through the centre of the wallplate.

Use a level to help align the wall plate, then mark the mounting holes on either side.

The mounting hardware supplied in the ZEN package consists of 2 wall anchors and 2 screws. The wall anchors are suitable for use on both drywall and plaster.
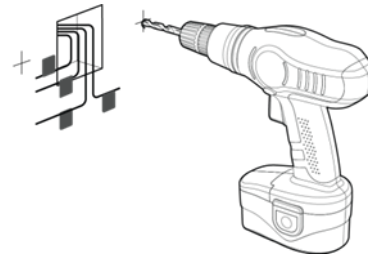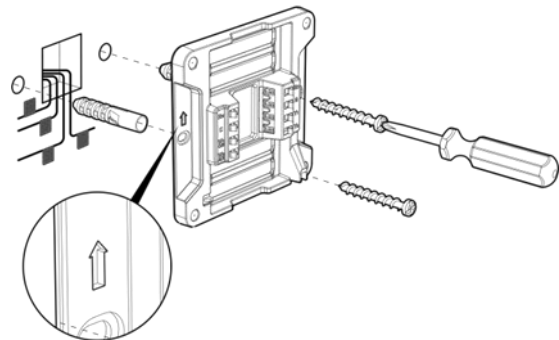
Use a 1/4in (6mm) drill bit to drill holes for the wall plugs. Ensure that the wires are kept out of the way when drilling.

Insert the wall anchors into the holes.

Attach the wallplate using the screws provided.

Take note of the orientation arrow which should point upwards.

If your previous thermostat was larger, you may choose to use the blanking plate to cover any unsightly areas.

The blanking plate is sandwiched between the wall plate and the wall and does not require any extra screws to attach.
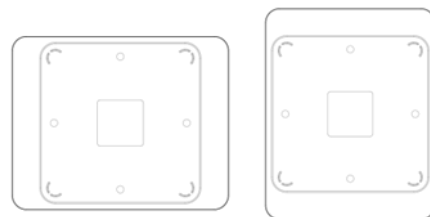
The blanking plate can be used in either portrait or landscape orientation

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Attaching the main display

ZEN requires 4 AA batteries to operate the main display, even when a C-wire is connected.

If a C-wire is available, the batteries are only used when the unit is off the wall and will last indefinitely.

If no C-wire is present, the batteries will last for 2 years under typical use conditions.

The main display attaches to the wall plate by magnets located at each corner.

Once located, the electrical connection is made between the terminals on the wall plate and the main display.

There is also a small push switch on the rear of the main unit which is used to determine if the main display is on the wall.

When the main display is on the wall, the ZEN user interface allows for setting the temperature and mode of the HVAC system

When the main display is removed from the wall, it enters PREFS mode which allows setting of the thermostat preferences.
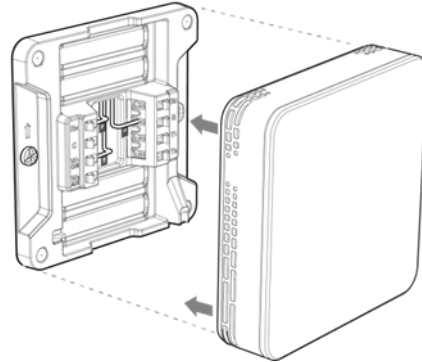
Configuring ZEN

ZEN uses a configuration code to set the important working parameters required by a thermostat. These include the type and number of heating and cooling stages. A detailed description of the ZEN configuration codes is given in the following section.

When first installed, ZEN does not have any configuration set. The display will show "ZEN" until the CONFIG button is pressed and configuration is entered.

This sequence is intended to force the user or installer to determine the correct configuration of the device before they can operate the heating or cooling. This reduces the likelihood of damaging the HVAC system through incorrect installation.

Some existing thermostats have dipswitches that may change the configuration of the existing wire labels. If the thermostat you are replacing has multiple rows of wire labelling, make sure to check for dipswitches that may alter the configuration. Finding the original installation manual will assist you in getting the configuration set up correctly.
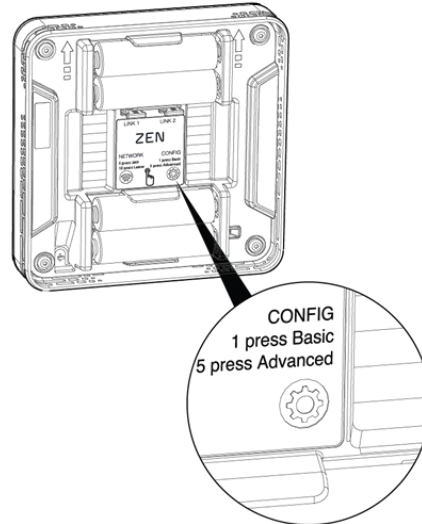
ZEN HVAC Configuration System

ZEN uses a configuration code to set the important working parameters required by a thermostat. These include the type and number of heating and cooling stages.

Basic configuration is suitable for most installations and is highly recommended for DIY installs.

Basic configuration allows the user to enter a 3-digit code which provides all the information required to configure the thermostat.

The first step in setting the basic configuration is to remove ZEN from the wall, turn it over so the rear of the display is accessible, then press the CONFIG button *once*.

CONFIG
1 press Basic
5 press Advanced

ZEN Basic Configuration Code

The ZEN online installation guide automatically determines the required configuration code based on the following items entered by the user:

- Wiring of the old thermostat
- Type of heating system

The configuration code is a 3 digit alpha-numeric code. Each digit has a distinct function:

Heating Type

Heatpump and Fan options

Cooling Type
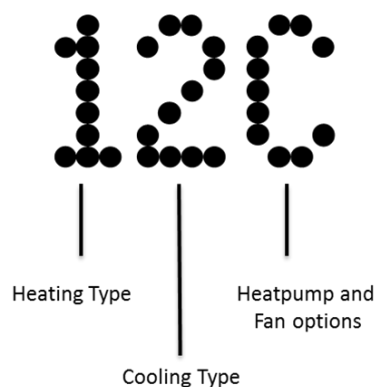
The possible values for each digit, and their meaning, are shown on the following page.

Changing the Basic Configuration

Once in basic configuration mode:

- Touch up or down to scroll through the list of configurations
- Centre touch to select the configuration
- The code will flash to confirm selection
- Exit configuration mode by placing the display back on the wall plate.

Effect on User Interface

The ZEN thermostat user interface automatically adjusts to only show the heating and cooling options that are available in the configuration.

As an example, if the configuration is set to 10A (1 stage heating, no cooling, no fan control), then the user will be able to select Heating mode but not Cooling or Fan Control mode.

If the configuration is set to 31P (heatpump heating and cooling with emergency heat and fan control), then the user will be able to select Heating, Cooling, Emergency Heat and Fan Control mode.

Heating Type

The most important heating control parameter that is affected by the heating type is the maximum cycles per hour (CPH) that is used for each heating type. In particular, heatpump systems require fewer cycles per hour to ensure that the compressor is not cycled too often which can cause it to lock up.

Digit	Heating Type	Cycles per Hour
0	No heating	N/A
1	Single Stage, Fuel (Gas or Oil)	6
2	Single Stage, Electric	12
3	Single Stage, Heatpump	3
4	Single Stage, Hydronic	3
5	Not used	N/A
6	2 Stage, Fuel (Gas or Oil)	6
7	2 Stage, Electric	12
8	2 Stage, Heatpump	3
9	2 Stage, Hydronic	3

Cooling Type

Digit	Heating Type	Cycles per Hour
0	No cooling	N/A
1	Single Stage, Heatpump, Evaporative or Hydronic	3
2	Not used	N/A
3	Not used	N/A
4	Not used	N/A
5	Not used	N/A
6	2 Stage, Heatpump, Evaporative or Hydronic	3
7	Not used	N/A
8	Not used	N/A
9	Not used	N/A

Heatpump and Fan Options

Third Digit	Fan Control	Has Emergency Heating?	Switching changeover valve cools	Has a changeover valve
A	N	N	N	N
B	Y	N	N	N
C	N	Y	N	N
D	Y	Y	N	N
E	N	N	Y	N
F	Y	N	Y	N
G	N	Y	Y	N
H	Y	Y	Y	N
I	N	N	N	Y
J	Y	N	N	Y
K	N	Y	N	Y
L	Y	Y	N	Y
M	N	N	Y	Y
N	Y	N	Y	Y
O	N	Y	Y	Y
P	Y	Y	Y	Y

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Advanced Settings

Advanced configuration allows a professional HVAC installer to set more detailed system parameters.

⚠️ Any changes made in advanced configuration will override basic configuration settings, so it recommended that only a knowledgeable HVAC installer use the Advanced settings.

The first step in setting the advanced configuration is to remove ZEN from the wall, turn it over so the rear of the display is accessible, then press the CONFIG button *5 times*.

CONFIG
1 press Basic
5 press Advanced
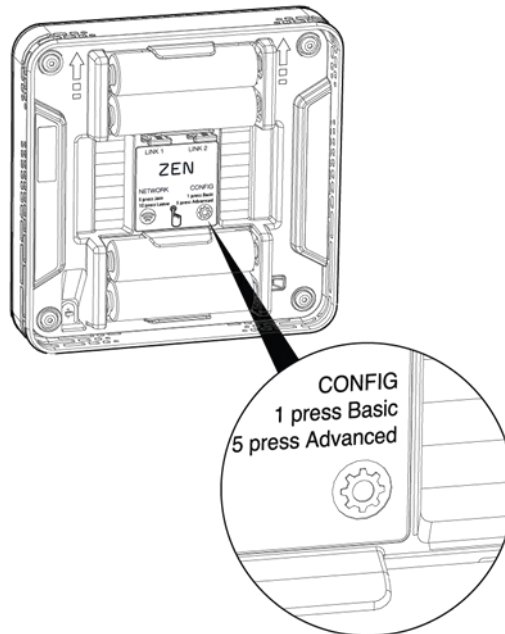
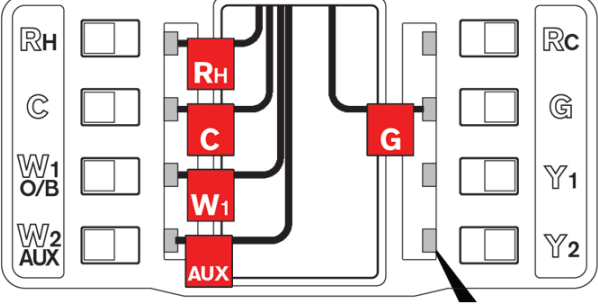## Changing the Advanced Settings

Once in advanced settings mode:

- Touch left or right to move to the setting items
- Touch up or down to change the value for each setting
- Center touch to select the setting
- The setting will flash to confirm selection
- Exit advanced settings mode by placing the display back on the wall plate.

Advanced Settings Using the Online Installation Guide

The recommended method for determining the correct Advanced Settings is through the ZEN online installation guide.

The guide will show an "Advanced Settings" button at the end of the installation workflow.

Advanced settings ❓

▶️

Click on the blue arrow to enter the advanced settings page.

Once in Advanced Settings, configure the thermostat using the following steps:

- Select the temperature units (F or C)
- Select the desired Settings Type Tab
- Use the dropdown boxes to select a Settings Value
- Once all settings have been made, change the thermostat settings by inputting the codes into the thermostat display that correspond to those shown in the Advanced Configuration Codes section at the bottom of the page.

Exit Advanced Settings mode by placing the display back on the wall plate.

Effect on User Interface

The Advanced Settings page automatically adjusts to only show the Settings Types that are determined by the Basic Configuration.

As an example, if the Basic Configuration is set to 10A (1 stage heating, no cooling, no fan control), then only the Heat Stage 1 and Misc Settings tabs will be shown.

If the Basic Configuration is set to 31P (heatpump heating and cooling with emergency heat and fan control), only the Heat Stage 1, Cool Stage 1 and Misc Settings tabs will be shown.
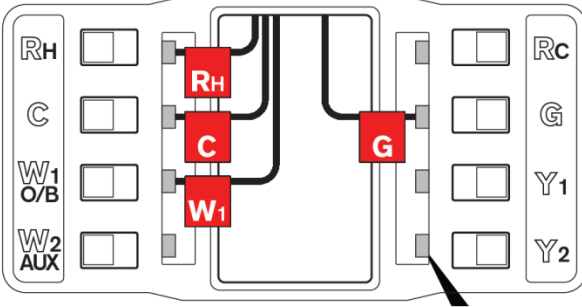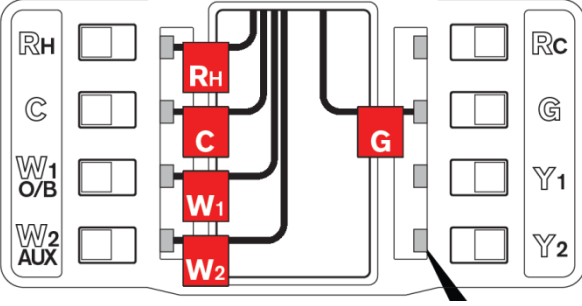
Resetting the Advanced Settings

The Advanced Settings are retained even when batteries are replaced or an OTA upgrade is made.

If the basic configuration is changed, the Advanced Settings will be lost.
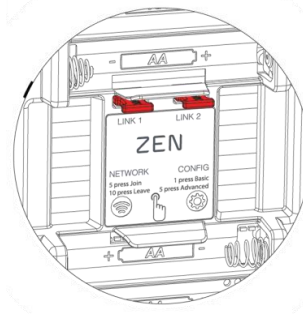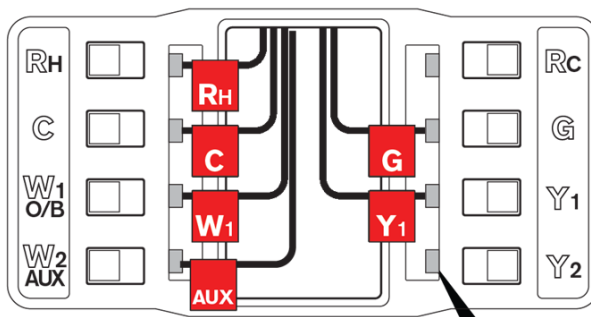
The Advanced Settings can be reset to the factory default by pressing the CONFIG button *20 times*
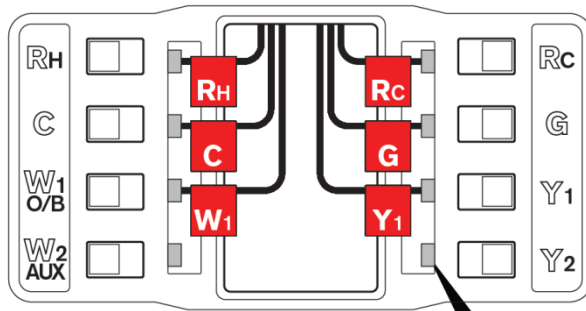
Typical wiring configurations

Wiring Diagram	Links	CONFIG Code
1 stage heating 		10A- 10B 20A – 20B 30A – 30B 40A – 40B
1 stage heating with emergency heat 		10C – 10D 20C – 20D 30C – 30D 40C –40D
2 stage heating 		60A – 60B 70A – 70B 80A – 80B 90A – 90B

1 stage heating and 1 stage cooling

R$_H$		
C		G
W$_1$		Y$_1$

R$_H$ R$_C$
C   G
W$_1$/O/B   Y$_1$
W$_2$/AUX   Y$_2$

ZEN

LINK 1   LINK 2

NETWORK   CONFIG
5 press Join   1 press Basic
10 press Leave   5 press Advanced
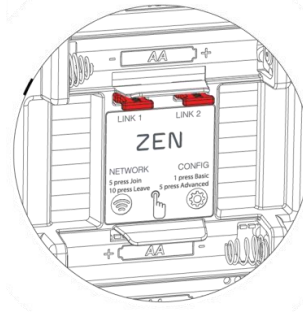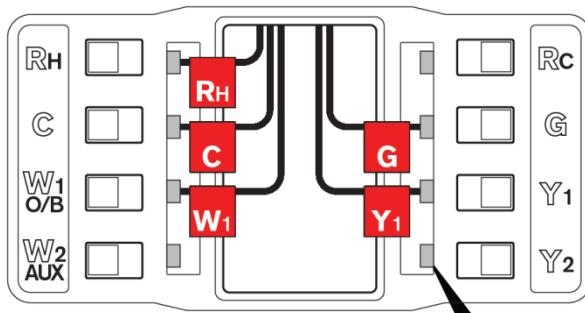
11A – 11B
21A – 21B
31A – 31B
41A – 41B

1 stage heating and 1 stage cooling with emergency heating

R$_H$
C   G
W$_1$ Y$_1$
AUX

R$_H$ R$_C$
C   G
W$_1$/O/B   Y$_1$
W$_2$/AUX   Y$_2$

ZEN

LINK 1   LINK 2

NETWORK   CONFIG
5 press Join   1 press Basic
10 press Leave   5 press Advanced

11C – 11D
21C – 21D
31C – 31D
41C – 41D

1 stage heating and 1 stage cooling (Separate Rh and Rc wires)

R$_H$ R$_C$
C   G
W$_1$ Y$_1$

R$_H$ R$_C$
C   G
W$_1$/O/B   Y$_1$
W$_2$/AUX   Y$_2$

ZEN

LINK 1   LINK 2

NETWORK   CONFIG
5 press Join   1 press Basic
10 press Leave   5 press Advanced

11A – 11B
31A – 31B
21A – 21B
41A – 41B

**1 stage heating, 1 stage cooling and emergency heat
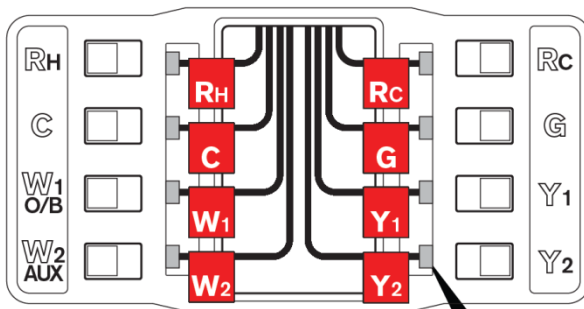(separate Rh and Rc wires)**
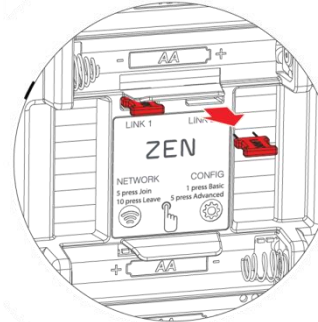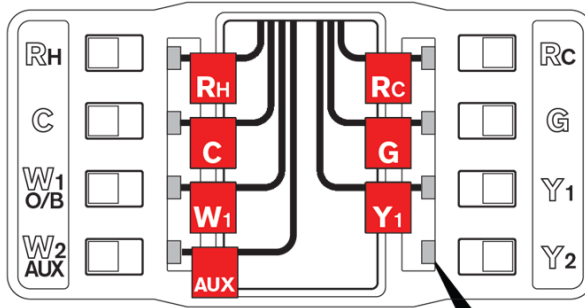
11C – 11D
31C – 31D
21C – 21D
41C – 41D
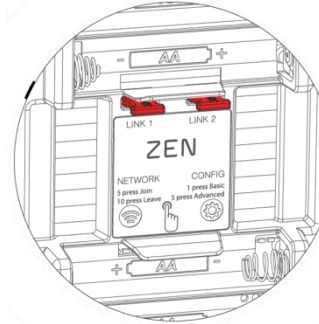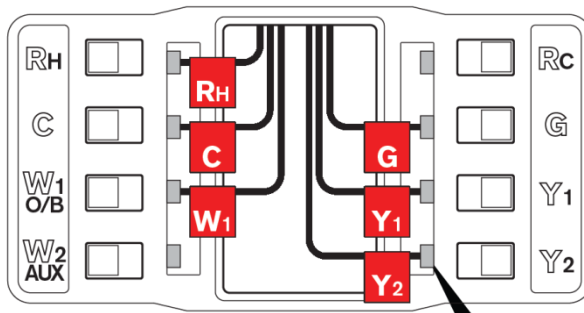
2 stage heating and 1 stage cooling
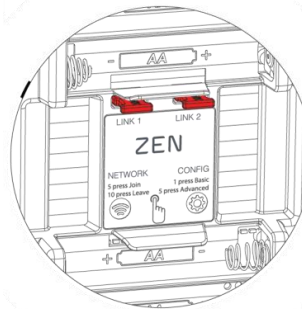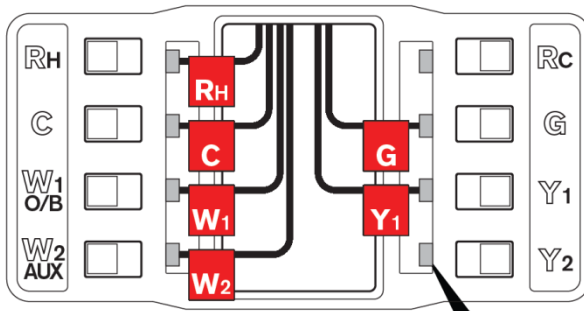
61A – 61B
71A – 71B
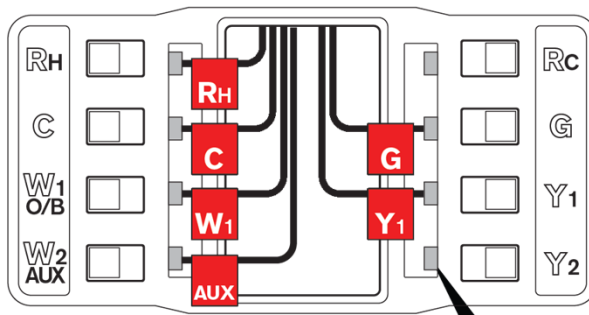81A – 81B
91A – 91B

**2 stage heating and 2 stage cooling
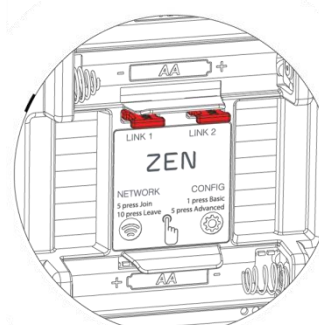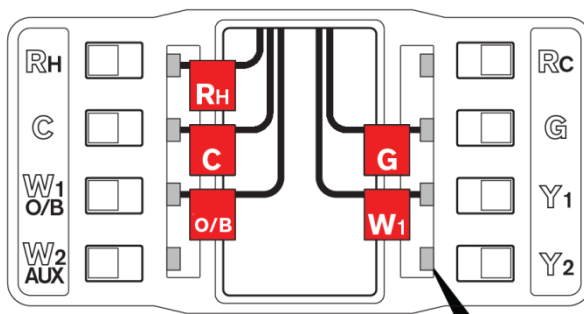(Separate Rh and Rc wires)**
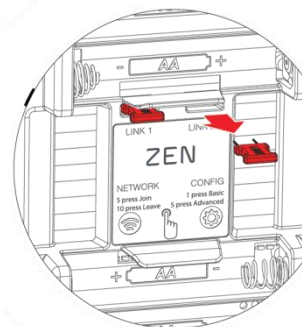
66A – 66B
76A – 76B
96A – 96B

ZEN

1 stage heating and 2 stage cooling
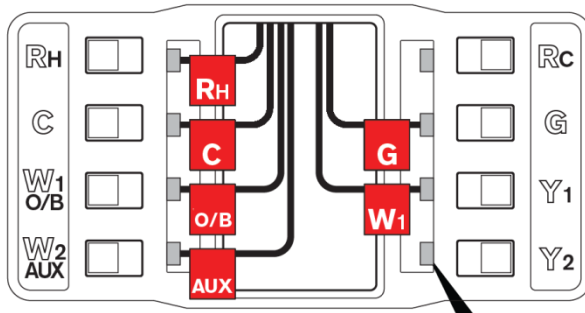

16A – 16B
26A – 26B
46A – 26B

1 stage heating and 2 stage cooling, with emergency heat

16C – 16D
26C – 26D
46C – 26D
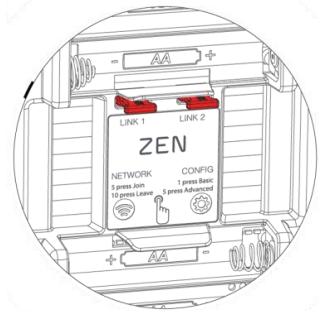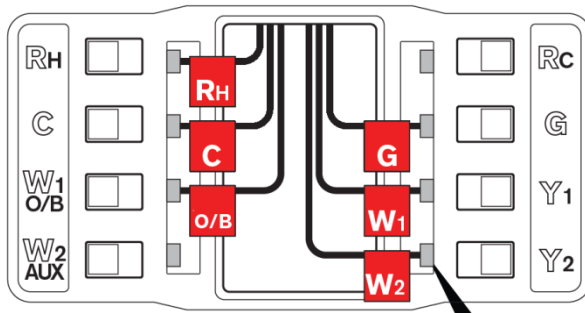
1 stage reversible heat pump (heat and cool)

31I
31J
31M
31N

ZEN

1 stage reversible heat pump (heat and cool) with emergency heat
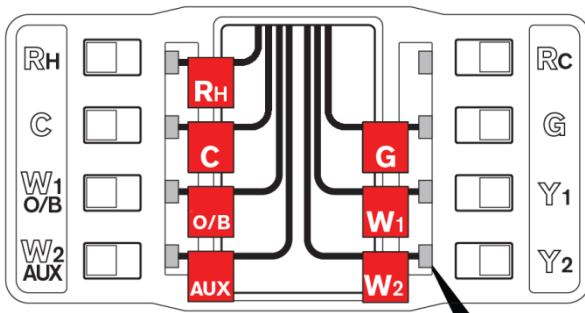

31K
31L
31O
31P
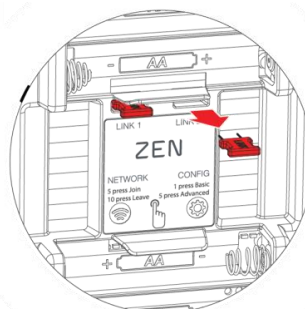
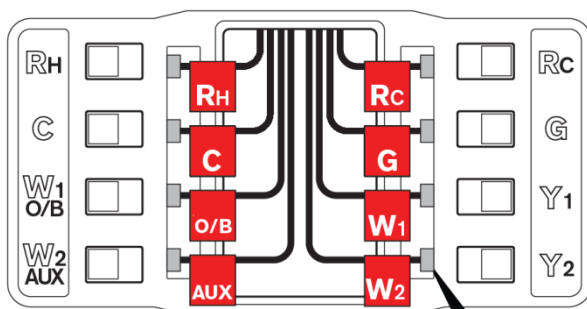### 2 stage reversible heat pump (heat and cool)

86I
86J
86M
86N

2 stage reversible heat pump (heat and cool) with emergency heat

86K
86L
86O
86P

ZEN

2 stage reversible heat pump (heat and cool)
with emergency heat (separate Aux and Rh return)

86K
86L
86O
86P

Network Connectivity

Compatibility

ZEN Thermostat is ZigBee HA 1.2 compatible and is continually being integrated into new home automation platforms. For the latest list of compatible platforms, please refer to the website – www.zenthermost.com

At the time of printing, the ZEN thermostat has been tested to work with the following home automation platforms:

- SwannOne
- OpenHome
- Smartthings

ZEN supports only standard ZigBee clusters and should, in theory, work with any ZigBee HA compatible system.

However, in practice, some integration effort may be required by the HA platform to ensure reliable operation.

If you are attempting to connect ZEN to a home automation platform which is not in the list above, and there are issues in the connection process, please contact the home automation platform support line.

Joining and Leaving a ZigBee Network

Joining

Once you've set your home network to search for a new device, remove the display from the wall mount and press the NETWORK button 5 times (the thermostat will beep on each button press).

The wireless icon will start flashing when pairing with your home network.

Once connected it will stop flashing and remain illuminated.

If you have joined a network but it is not the correct network, press the NETWORK button 5 times again to search for the next available network

Leaving

To leave a ZigBee network, remove the display from the wall mount and press the NETWORK button 10 times (the thermostat will beep on each button press).

The wireless icon will disappear once you have left the network.

NETWORK
5 press Join
10 press Leave

ZEN
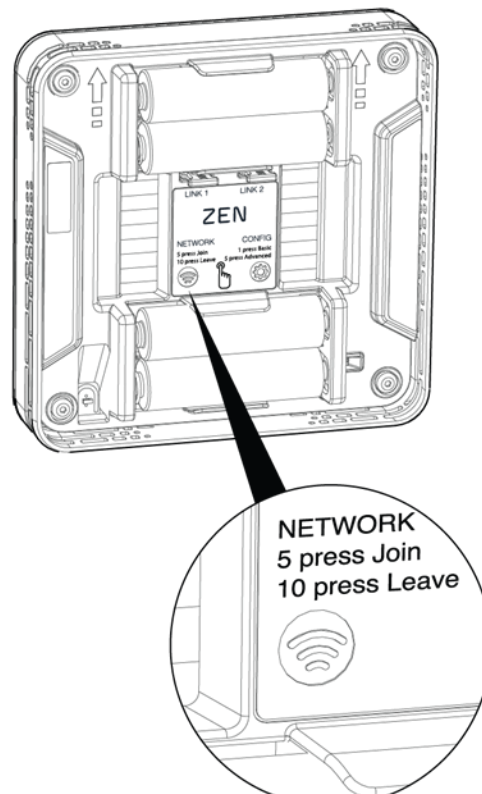
Useful Links

ZEN Thermostat Website   www.zenthermostat.com

ZEN Thermostat support email   info@zenthermostat.com

ZEN Thermostat Online Installation Guide   www.zenthermostat.com/install

ZEN Thermostat FAQ   www.zenthermostat.com/faq