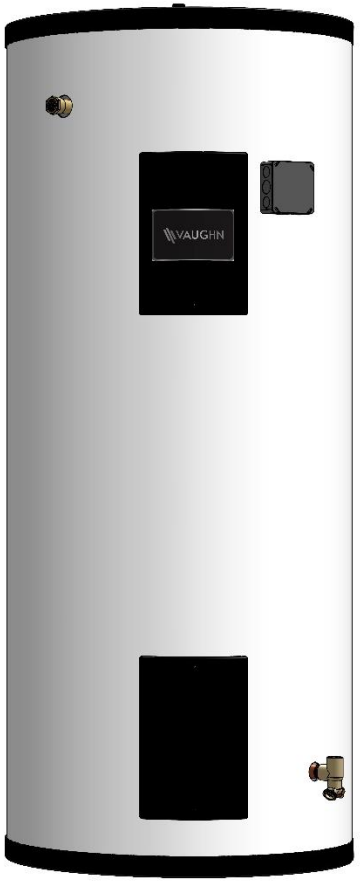
VAUGHN
a nudyne company

Operation and Installation Manual



Vaughn Hydrastone® Lined Electric Water Heater

INDEX

VAUGHN
a nudyne company

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SAFETY INFORMATION

WARNING / CAUTION

1. Tank is to be completely filled with water and all air is to be vented before energizing. Do not turn on the water heater if cold water supply shut off valve is closed.

2. Due to the rigors of transportation, all connections should be checked for tightness before the heater is placed in operation.

3. Safety relief valve must be installed in tapping provided.

4. The unit is designed to operate at pressure not more than 150 psi.

5. KEEP AWAY FROM LIVE ELECTRICAL CIRCUITS. Do not perform any maintenance, make any adjustments, or replace any components inside the control panel with the high voltage power supply turned on. Under certain circumstances, dangerous potential may exist even when the power supply is off. To avoid casualties, always turn the power supply safety switch off, turn the charge or ground the circuit before performing any maintenance or adjustment procedure.

6. Generalized instructions and procedures cannot anticipate all situations. For this reason, only qualified installers should perform the installations. A qualified installer is a person who has licensed training and a working knowledge of the applicable codes regulation, tools, equipment, and methods necessary for safe installation of an electric resistance water heater. If questions regarding installation arise, check with your local plumbing and electrical inspectors for proper procedures and codes. If you cannot obtain the required information, contact the company.

7. In the event of overheating, fire, flood, or physical damage, turn off all power to your water heater. Do not power up the heater until it has been examined by a trained professional.

8. Do not store or use gasoline or other flammable vapors and liquids, such as adhesives or paint thinner, in the vicinity of this water heater. If such flammable materials must be used near the unit, open nearby doors and windows to allow for ventilation.

9. California law requires, and other states may require, that all new and replacement water heaters, and all existing water heaters, must be braced, anchored, or strapped to resist falling or horizontal displacement due to earthquake motion. At a minimum, any water heater shall be secured in accordance with the California Plumbing Code.

GENERAL INFORMATION

PLEASE READ INSTRUCTIONS COMPLETELY BEFORE INSTALLING WATER HEATER

IMPORTANT OWNER'S RESPONSIBILITY

Vaughn Thermal Corporation (herein called the Company) specifically does not expressly or impliedly warrant the merchantability or the fitness for any particular purpose or the performance of the heater within that system, nor does it assume liability for any consequential damage to general property or other components of the system.

This appliance is designed to store water heated only by the electrical elements provided at pressures of not more than 150 psi. Heat input from any external or additional source will void the warranty.

The design anticipates the proper installation and care in use of the product. There is risk of property damage and personal injury inherent in the use of any hot water system. The Company cannot supervise the installation and therefore makes it a specific condition of the warranty that the customer will supervise the installation and use of this product to be sure they are performed in accordance with these instructions, as well as safe industry guidelines and proper local or national codes.

Generalized instructions and procedures cannot anticipate all situations. For this reason, only qualified installers should perform the installation. A qualified installer is a licensed person who has appropriate training and a working knowledge of the applicable codes, regulations, tools, equipment, and methods necessary for safe installation of an electrical resistance water heater.

An installation checklist has been provided to help the customer ensure that all procedures for a safe installation have been followed.

If questions regarding installation arise, check with your local plumbing and electrical inspectors for proper procedures and codes. Local codes take precedence over instructions in this manual.

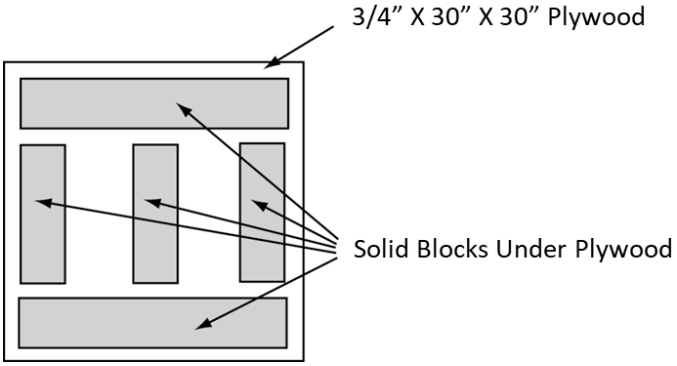
INSTALLATION GUIDELINES

A. INSPECTING AND PREPARING THE HEATER

- Disassemble the crate and remove the shrink wrap packaging.
- The packaging will contain a temperature and pressure relief valve.
- Do not cover or damage the temperature and pressure relief valve opening located on the top left of the tank.

B. LOCATION

- **CAUTION: All tanks will eventually leak at some unpredictable time.**
- **CAUTION: The heater's outer jacket is plastic and can melt.**
- Do not place the heater where there is a risk of property damage in the event of a leak.
- Place the heater on a solid foundation in a clean, dry location.
- The heater should be protected from freezing, and water lines should be insulated to reduce energy and water waste.
- Leave sufficient room to service the heating elements and electrical controls.
- Do not install in an area where flammable liquids or combustible vapors are present.
- Do not install in close proximity to wood burning stove or other high temperature systems.
- **NOTE: If heater is placed on blocks to raise it from the floor, be sure to support the entire bottom with at least ¾" plywood on the top of the blocks.**



C. PROTECTION FROM WATER DAMAGE

- **CAUTION: All tanks will eventually leak at some unpredictable time.**

- **IT IS THE CUSTOMER'S RESPONSIBILITY TO PROVIDE A CATCH PAN OR OTHER ADEQUATE MEANS, SO THAT THE RESULTANT FLOW OF WATER WILL NOT DAMAGE FURNISHINGS OR PROPERTY.**
- The warranty provided assures replacement within its terms, but specifically does not warrant against consequential damage caused by failure to follow these instructions.

D. TEMPERATURE & PRESSURE RELIEF VALVE

- **WARNING: A POTENTIAL HAZARD TO LIFE AND PROPERTY MAY EXIST IN ANY WATER HEATER IF AN APPROVED TEMPERATURE-AND-PRESSURE RELIEF VALVE IS NOT PROPERLY INSTALLED.**
- For protection against excessive pressures and temperatures in this water heater, install temperature-and-pressure protective equipment required by local codes, but not less than a combination temperature-and-pressure relief valve certified by a nationally recognized testing laboratory that maintains periodic inspection of production of listed equipment of materials, as meeting the requirements for Relief Valves and Automatic Gas Shutoff for Hot Water Supply Systems. ANSI Z21.22.1971. This valve must be marked with a maximum set pressure not to exceed the marked maximum allowable working pressure of the water heater (150psi). Install the valve into an opening provided and marked for this purpose in the water heater and orient it or provide tubing so that any discharge from the valve will exit only within 6 inches above, or at any distance below the structural floor and cannot contact any live electrical part. The discharge opening must not be blocked or reduced in size under any circumstances.
- **CAUTION: A relief valve is designed to discharge excessively hot water. THE CUSTOMER IS RESPONSIBLE TO PROTECT PROPERTY AND PERSONNEL FROM HARM WHEN THE VALVE FUNCTIONS.**
- The temperature and pressure relief valve opening is a ¾" NPT female threaded fitting for all models and is located at the top of the tank.
- Install the provided temperature and pressure relief valve in the provided fitting on the side of the tank as shown in INSTALLATION DIAGRAM 1 on page 19, INSTALLATION DIAGRAM 2 on page 20, and INSTALLATION DIAGRAM 3 on page 21.
- The drain line from the relief valve must not be concealed or blocked and must be protected from freezing.
- No valve of any kind should be installed between the relief valve and tank or in the drain line.

- ❑ **WARNING: If the water supply is from a well, or known to have hard water, it is recommended to use a pressure relief valve in the cold-water line as well as a temperature and pressure relief valve in the hot water line.**

E. WATER CONNECTIONS

- ❑ **WARNING: Some local codes mandate the use of a backflow preventer or check valve or pressure-reducing valve. An adequate expansion tank (or other adequate means) must be installed to prevent pressure build up or damage from thermal expansion when a check valve or backflow preventer or pressure-reducing valve is used. Failure to do so could result in tank leakage and therefore void the warranty.**
- ❑ The hot and cold-water fittings are a threaded connection to the tank. Do not over tighten.
- ❑ Water inlet connections are ¾" NPT female threaded fittings on S and ME models. This connection serves as an inlet and drain combination. See INSTALLATION DIAGRAM 1 on page 19.
- ❑ Water inlet connection is a 1.5" NPT male threaded fitting on D models. This connection is separate from the drain valve. See INSTALLATION DIAGRAM 3 on page 21.
- ❑ Provide a shut off valve on the cold-water line. Mark for future emergency use.
- ❑ **Do not apply heat directly to the cold-water inlet as it includes a plastic dip tube which can melt.**
- ❑ Water outlet connections are ¾" NPT male threaded fittings on S and ME models. See INSTALLATION DIAGRAM 1 on page 19.
- ❑ Water outlet connection is a 1.5" NPT male threaded fitting on D models. See INSTALLATION DIAGRAM 3 on page 21.

F. FILLING THE HEATER

- ❑ **CAUTION: Do not put electrical power to the elements until after the heater is completely filled with water.**
- ❑ **Check that the temperature and pressure relief valve has been properly installed (mandatory requirement).**
- ❑ Completely close the drain valve.
- ❑ Open the highest hot water opening to allow all air to escape from piping.
- ❑ Open the valve to the cold-water and allow the heater and piping system to completely fill, as indicated by a steady flow of water from the hot water opening.

G. WIRING CONTROLS

- **WARNING: The heater elements will be damaged instantly if energy is supplied before the tank is completely filled with water, thus voiding any warranty.**
- Supply to the heater only the voltage indicated on the rating plate.
- Enter junction box with properly sized feeder leads. Note that overcurrent circuit protection is required.
- Mark the electrical shut off clearly for future emergency use.
- ME and D model tanks are designed for operation with 1 element at a time (Non-Simultaneous operation).
- S model tanks are designed for operation with both elements at the same time (Simultaneous operation).
- Reference wiring diagrams before making electrical connections (See applicable Wiring Diagrams on pages 11 through 18).
- Field connections with aluminum conductors must use connectors approved for copper to aluminum connection.
- **CAUTION: There is a risk of electric shock in an ungrounded service. It is critical that this unit be wired with a power supply that has a service ground wire available. Be sure to connect the ground wire to the green ground screw in the junction box.**

H. SUPPLEMENTAL HEAT WARNINGS

- **NOTE: Heat input from any external or additional source will void the warranty.**
- When a supplemental heat source is connected to the storage tank water heater, provision must be made to limit the heat source temperature not to exceed that of the water heater thermostat setting.
- **CAUTION: If the water heater has been retrofitted with supplemental heating equipment, you must adjust both the controller on the supplemental heat source (located in the water piping) and the controller on the water heater to the same temperature. Failure to adjust both controllers to the same temperature can cause loss of proper temperature control.**

I. STATE OF CALIFORNIA

- The water heater must be braced, anchored, or strapped to avoid moving during an earthquake.
- Contact local utilities for code requirements in your area, visit http://www.dsa.dgs.ca.gov, or call 1-916-445-8100 and request instructions.

INSTALLATION CHECKLIST

1. INSPECTING AND PREPARING THE HEATER

- ❑ Remove the packaging and locate the temperature and pressure relief valve.
- ❑ Do not cover temperature and pressure relief valve opening.

2. LOCATION

- ❑ Solid foundation and dry location.
- ❑ Protect heater water lines from freezing.
- ❑ Area free of flammable vapors.
- ❑ Sufficient room to service heater.
- ❑ Not in close proximity to high temperature systems.
- ❑ A leak will not damage property.

3. PROTECTION FROM WATER DAMAGE

- ❑ Be sure to make provisions to protect the area from water damage if a leak should occur in the tank or any connected fittings.

4. TEMPERATURE & PRESSURE RELIEF VALVE

- ❑ **WARNING: Improper installation will present potential hazard to life and property.**
- ❑ A temperature and pressure relief valve with an 8-inch stem should be used.
- ❑ Check to be sure that proper relief valve requirements are met.
- ❑ Temperature and pressure relief valve discharge pipe properly protected from freezing and restrictions.
- ❑ No valve between tank and relief valve or in drain line.

5. WATER CONNECTIONS

- ❑ Do not over tighten threaded connections.
- ❑ Mark the water shut off for future reference.
- ❑ Do not apply heat to cold inlet.
- ❑ **If there is a check valve (sometimes in water meter), backflow preventer or pressure-reducing valve, install an adequate size expansion tank.**

6. FILLING THE HEATER

- ❑ Completely fill heater before turning on elements.
- ❑ Check for proper installation of relief valve, hot, and cold fittings.

- ❑ Close drain valve.
- ❑ Open the highest hot water faucet.
- ❑ Open cold water inlet valve and fill system.
- ❑ Water connections free of leaks.

7. WIRING

- ❑ **WARNING: Tank must be full of water before turning the power on.**
- ❑ Separate fused branch circuit (refer to local codes).
- ❑ Mark the electrical shut off for future reference.
- ❑ See applicable Wiring Diagrams on pages 11 through 18.
- ❑ Check to see that voltage on rating plate and supply agree.
- ❑ **CAUTION: Unit must be properly grounded.**

8. INSTALLATION COMPLETED AND CHECKLIST FILLED OUT

BY: _____

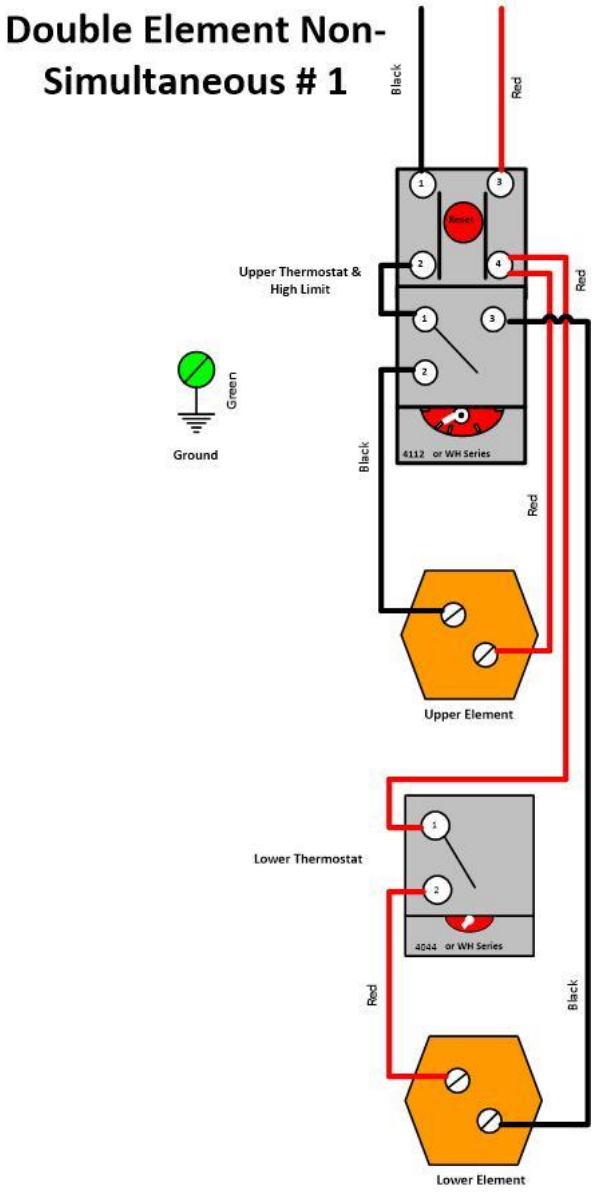
DATE: _____

NOTES: _____

SPECIAL NOTE: Test of hot water after installation is necessary to be sure temperature controls are working properly. (See Water Temperature Regulation on page 22).

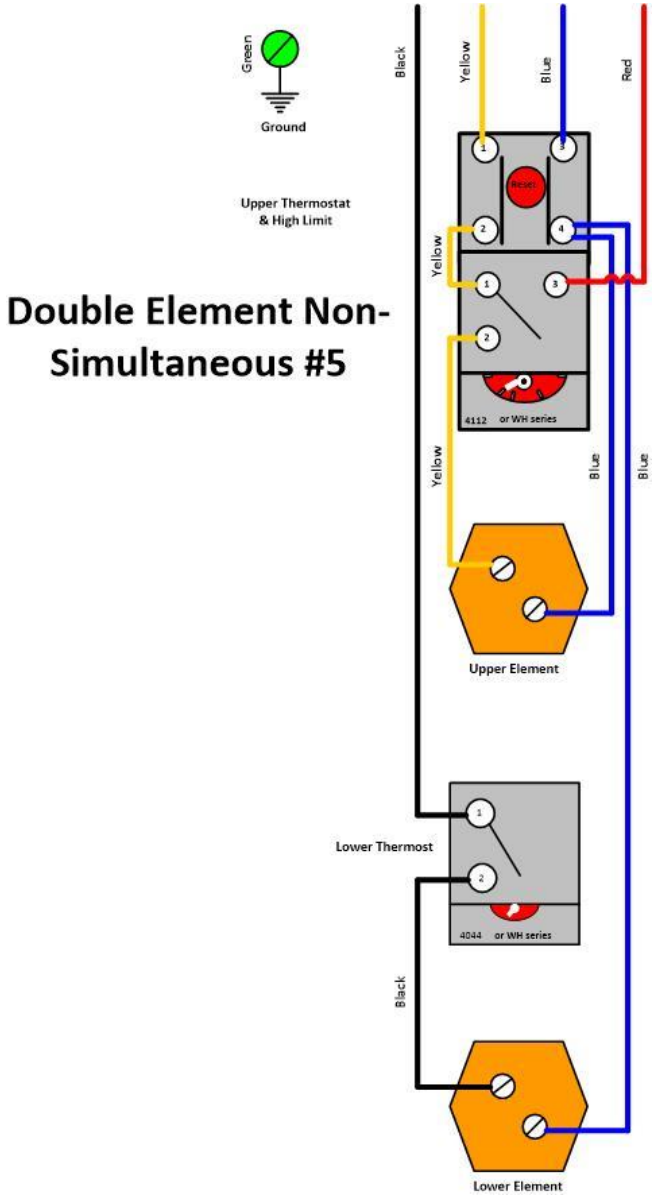
WIRING DIAGRAM 1

Two Element Configuration with Mechanical Thermostats
Non-Simultaneous (#1 Wiring)



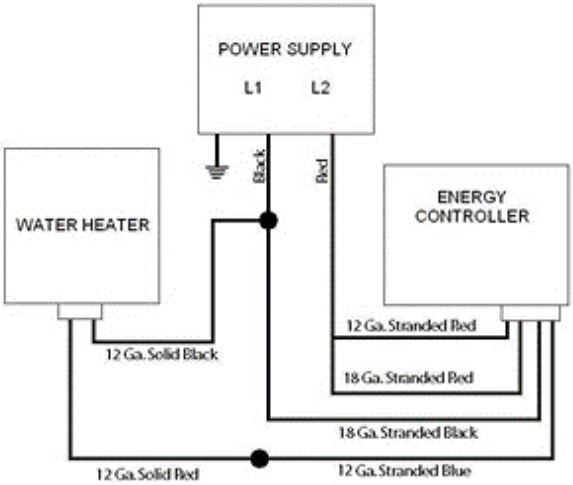
WIRING DIAGRAM 2

Two Element Configuration with Mechanical Thermostats
Non-Simultaneous (#5 Wiring)

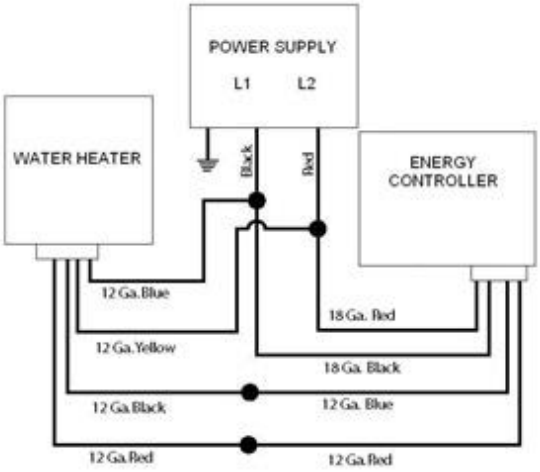


WIRING DIAGRAM 3

For Use with Energy Controller Equipped Heaters Only
Control of Upper and Lower Elements (#1 Wiring)

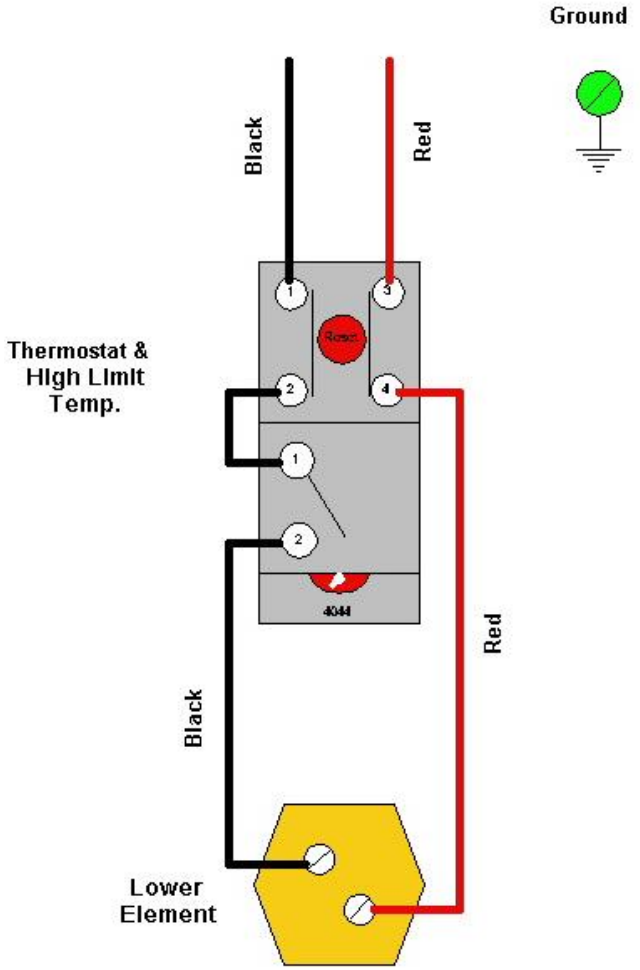


For Use with Energy Controller Equipped Heaters Only
Control Lower Elements Only (#5 Wiring)



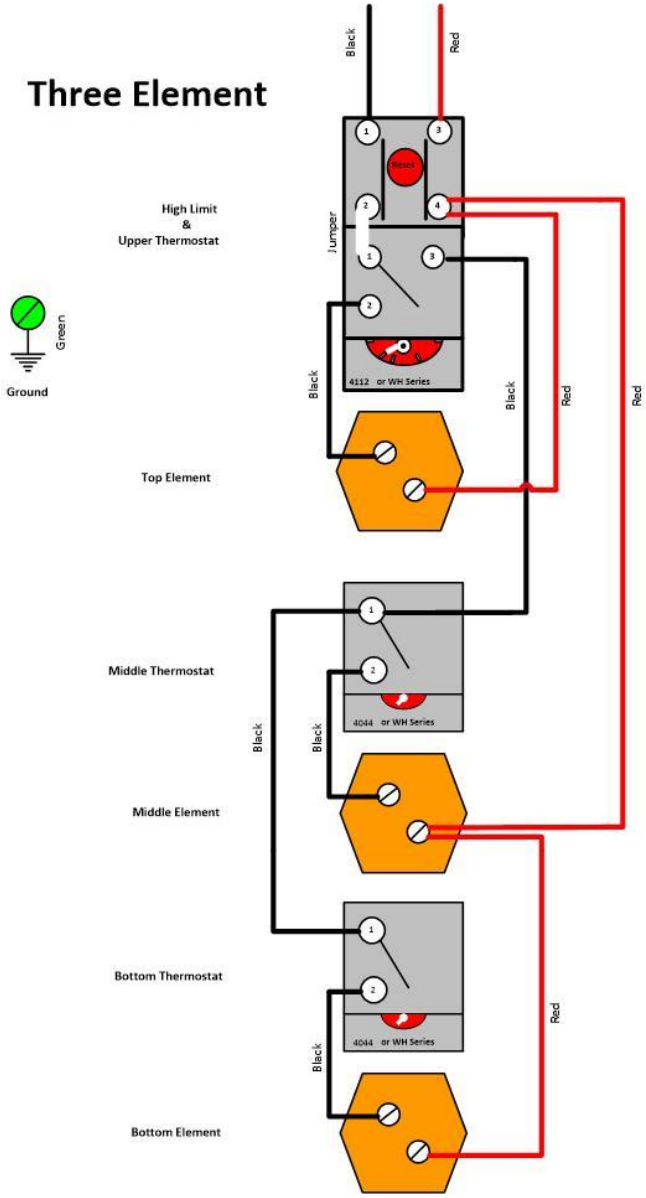
WIRING DIAGRAM 4

One Element Configuration with Mechanical Thermostat



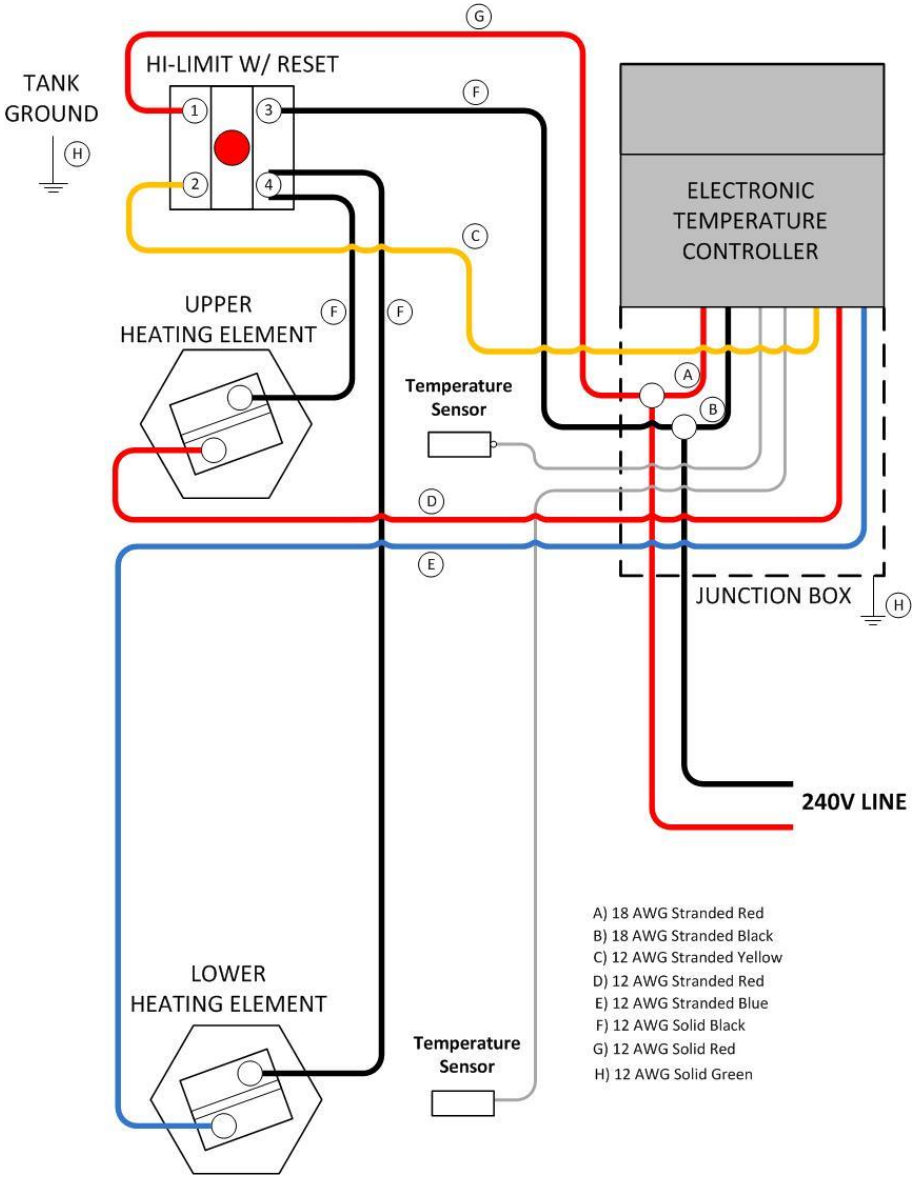
WIRING DIAGRAM 5

Three Element Configuration with Mechanical Thermostats
Non-Simultaneous



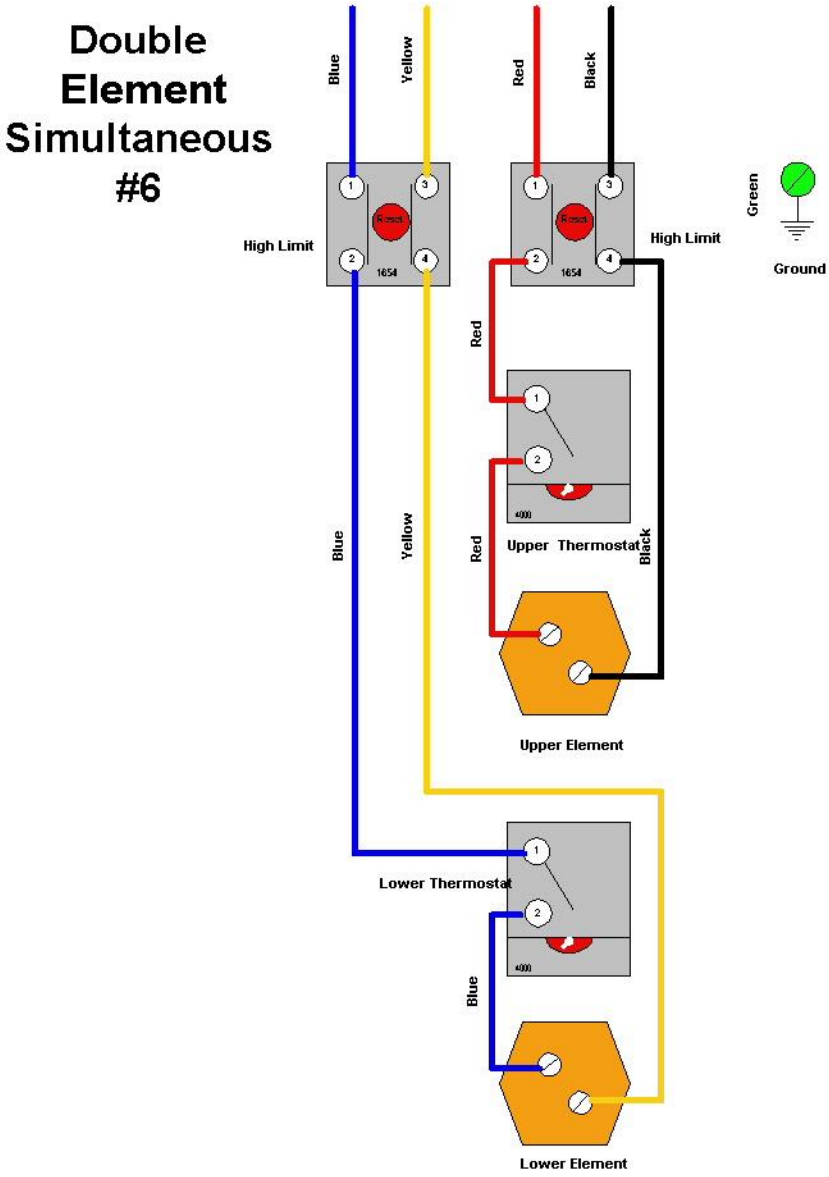
WIRING DIAGRAM 6

ETC with Two Element Configuration Non-Simultaneous



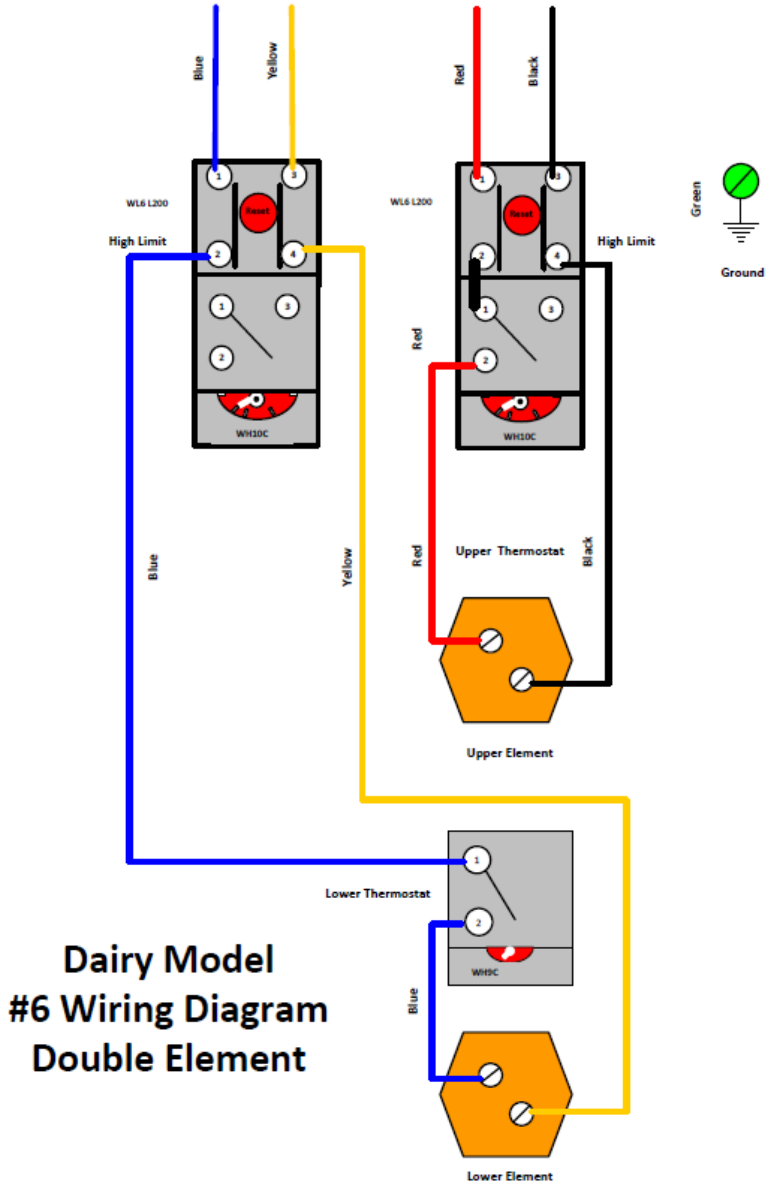
WIRING DIAGRAM 7

S Model Double Element Configuration with Mechanical Thermostats Simultaneous Operation (#6 Wiring)



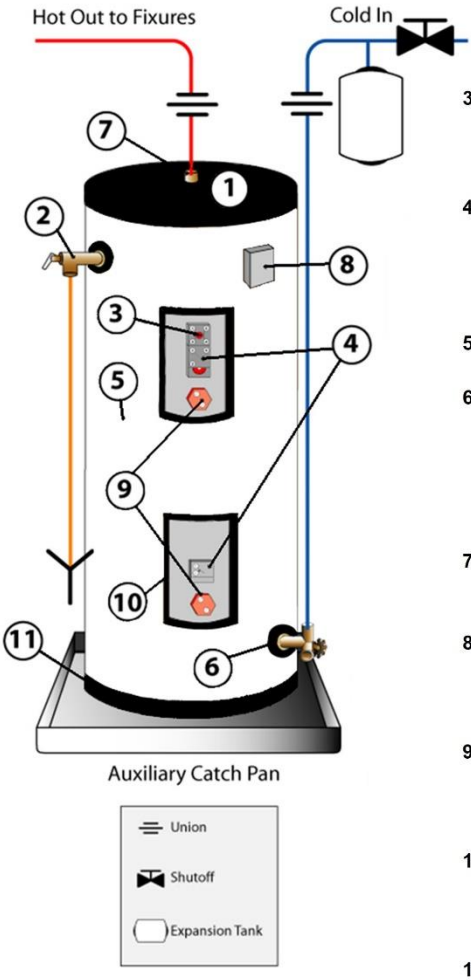
WIRING DIAGRAM 8

S Model Double Element Configuration with Mechanical Thermostats Simultaneous Operation (High Temperature Usage)



INSTALLATION DIAGRAM 1

S or ME Model Shown with Mechanical Thermostats

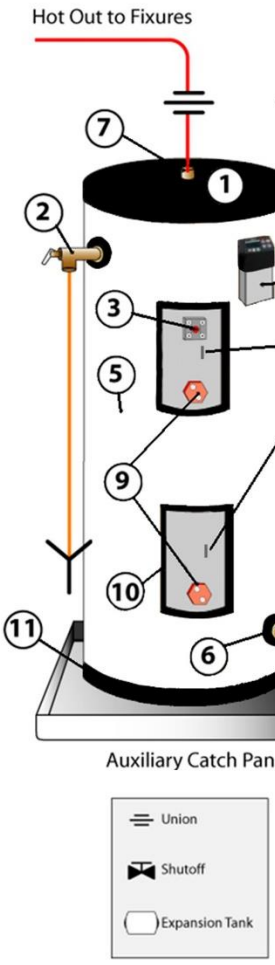


1. **Top Pan**
2. **Relief Valve** – Located at the top of the water heater, designed to automatically activate if tank reaches dangerous temperatures or pressures.
3. **High Limit Safety Switch** – Manual reset switch designed to shut off all electrical circuits if water reaches the setpoint of 190°F or greater.
4. **Automatic Thermostats** – For constant temperature control, thermostats are specifically designed for Hydrastone® water heaters. Located under access plates.
5. **Plastic Jacket** – Durable & easy-to-clean jacket is hi density plastic.
6. **Water Diffuser** – Introduces cold water at the bottom of the tank in a flat, gentle swirl, preventing turbulent mixing with heated water above. Tank drain is also a part of the cold-water diffuser on S and ME models but is separate on D Models.
7. **Hot Water Outlet Nipple with Heat Trap** - Designed to keep hot water within the tank and reduce standby loss.
8. **Wiring & Connections** – Located in front of the heater for easy installation and access. All wiring is designed for operation up to 12kW @ 240volts.
9. **Long-Life Heating Elements** – Water heating elements with low watt density assure longer life and reduce mineral buildup.
10. **High-Density Insulation** – Two or three inches of high-density foam blanket the storage tank. Extra thickness on top and bottom significantly reduce heat loss.
11. **Bottom Pan**

NOTE: When ordering parts, please specify model and serial number of tank, shown on the rating plate, as well as parts name, information and number. See Replacement Parts on page 36.

INSTALLATION DIAGRAM 2

S or ME Model Shown with an Electronic Temperature Controller

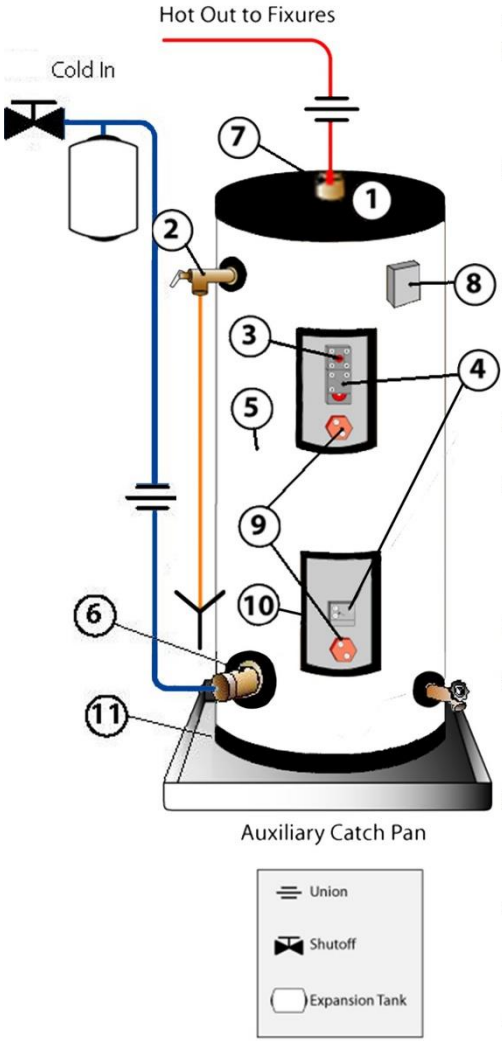


1. **Top Pan**
2. **Relief Valve** – Located at the top of the water heater, designed to automatically activate if tank reaches dangerous temperatures or pressures.
3. **High Limit Safety Switch** – Manual reset switch designed to shut off all electrical circuits if water reaches the setpoint of 190°F or greater.
4. **Thermistors** – Thermistors for each element located under the access plates.
5. **Plastic Jacket** – Durable & easy-to-clean jacket is hi density plastic.
6. **Water Diffuser** – Introduces cold water at the bottom of the tank in a flat, gentle swirl, preventing turbulent mixing with heated water above. Tank drain is also a part of the cold-water diffuser on S and ME models but is separate on D Models.
7. **Hot Water Outlet Nipple with Heat Trap** - Designed to keep hot water within the tank and reduce standby loss.
8. **ETC, Wiring, & Connections** – Electronic controller designed to maximize temperature regulation. Located in front of the heater for easy installation and access. All wiring is designed for operation up to 12kW @ 240volts.
9. **Long-Life Heating Elements** – Water heating elements with low watt density assure longer life and reduce mineral buildup.
10. **High-Density Insulation** – Two or three inches of high-density foam blanket the storage tank. Extra thickness on top and bottom significantly reduce heat loss.
11. **Bottom Pan**

NOTE: When ordering parts, please specify model and serial number of tank, shown on the rating plate, as well as parts name, information and number. See Replacement Parts on page 36.

INSTALLATION DIAGRAM 3

D Model Shown with Mechanical Thermostats



1. **Top Pan**
2. **Relief Valve** – Located at the top of the water heater, designed to automatically activate if tank reaches dangerous temperatures or pressures.
3. **High Limit Safety Switch** – Manual reset switch designed to shut off all electrical circuits if water reaches the setpoint of 190°F or greater.
4. **Automatic Thermostats** – For constant temperature control, thermostats are specifically designed for Hydrastone® water heaters. Located under access plates.
5. **Plastic Jacket** – Durable & easy-to-clean jacket is hi density plastic.
6. **1.5" Water Diffuser** – Introduces cold water at the bottom of the tank in a flat, gentle swirl, preventing turbulent mixing with heated water above. Tank drain is separate.
7. **1.5" Hot Water Outlet** – High volume flow outlet for more water.
8. **Wiring & Connections** – Located in front of the heater for easy installation and access. All wiring is designed for operation up to 12kW @ 240volts.
9. **Long-Life Heating Elements** – Water heating elements with low watt density assure longer life and reduce mineral buildup.
10. **High-Density Insulation** – Two or three inches of high-density foam blanket the storage tank. Extra thickness on top and bottom significantly reduce heat loss.
11. **Bottom Pan**

NOTE: When ordering parts, please specify model and serial number of tank, shown on the rating plate, as well as parts name, information and number. See Replacement Parts on page 36.

TEMPERATURE CONTROL

A. WATER TEMPERATURE REGULATION

WARNING: Exposure to water hotter than 125° can cause scalding injuries. Appropriate caution must be taken when using hot water. Special supervision must be given to those who cannot act quickly such as children, disabled, or elderly persons.

The temperature of the water in the heater is regulated by a Vaughn temperature controller. This automatic control is set at the factory to maintain a water temperature of 125°F. Although these controls are designed to meet industry standards, they can fail to control temperatures properly without any notice, and therefore should be tested periodically for your protection.

To test the temperature, turn on the hot water faucet and measure the maximum temperature with an accurate thermometer. If the temperature is above the safe limits for your circumstances call a service technician to adjust or replace the control.

DANGER: IF YOU DISCOVER EXTREME HOT WATER COMING FROM THE FAUCET, IMMEDIATELY SHUT OFF THE ELECTRICITY AT THE MAIN SWITCH AND CALL COMPETENT SERVICE PERSONNEL. ANY OVERHEATED WATER HEATER IS A POTENTIAL HAZARD TO LIFE AND PROPERTY. DO NOT OPERATE UNTIL THE SOURCE OF THE PROBLEM HAS BEEN DETERMINED AND ELIMINATED.

- Water temperature over 125° F can cause severe burns instantly or death from scalds.
- Children, disabled, and elderly are at the highest risk of being scalded.
- See instruction manual before setting the temperature at the water heater.
- Feel water before bathing or showering.

B. SAFETY CONTROLS

- The heater has a high-limit control that is located at the top opening of the tank.
- This surface mounted high limit is designed to interrupt the flow of electricity to all elements when it senses dangerously high temperatures. If this switch operates, do not attempt to reset. A dangerous situation is indicated, and a qualified service person should be called to find the source before the unit is operated again.
- The temperature of the water should be tested periodically at the faucet to be sure temperature controllers are working properly.

C. MECHANICAL THERMOSTATS

- The standard Vaughn electric water heater is equipped with a mechanical thermostat for each installed electric element.
- The standard mechanical thermostats provide the user with the ability to control the temperature of their water heater. It allows basic customization, limited to temperature set point. Once the setup is complete the water heater is automatic in operation and will maintain a full tank of water at the temperature setting of the thermostats.
- Any temperature adjustments of thermostats must be made by qualified service personnel as follows:
  - Remove the cover panel with an insulated handle screwdriver.
  - Remove the insulation behind panel.
  - Adjust the pointer on the thermostat(s) with the insulated screwdriver to the desired temperature and check to see that the proper temperature is achieved. (Do not remove protective cover from thermostat.)
  - Replace the insulation, the cover panel, and reconnect electrical service.
  - Be sure that insulation is replaced carefully. Malfunction of the thermostat will occur if voids are left in the insulation.
  - *Both upper and lower thermostats should be set at the same temperature under normal residential conditions.
  - See FIGURE 1 on page 32.

D. OPTIONAL ETC CONTROLLER

- The optional Vaughn Electronic Temperature Controller (ETC) provides the user with the ability to control and customize the operation of their water heater. The 4-digit display shows the current status of the water heater and can display useful information such as current temperature conditions inside the tank, error notifications, and more. It allows basic customization, such as mode and temperature set point, as well as more advanced options, such as temperature

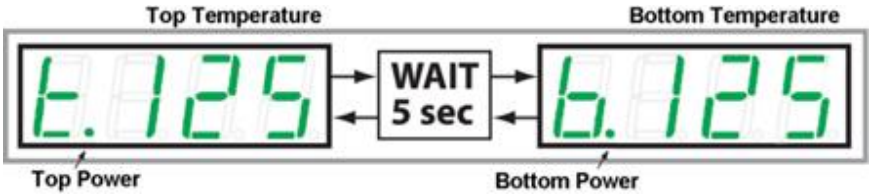
differential, and display options. Once the setup is complete the water heater is automatic in operation and will maintain a full tank of water at the temperature setting of the controller.

ETC Powering up your Water Heater for the First Time

- When the unit is first powered up, the default home screen is shown. This screen shows the temperature set point (e.g., 125).

ETC Home Screen

- The home screen provides a quick reference to the current status of the water heater, showing either the setpoint temperature or the actual temperatures at the top and bottom of the tank, denoted by “t” and “b” preceding the temperatures. The temperature readouts can be displayed in Fahrenheit or Celsius. There are power indicators to show which if any element should be on. These indicators blink when the element is heating properly.



ETC Button Overlay

- The button overlay provides the user with a means to alter the configuration settings and control the operation of the water heater. A brief description of the basic functionality of each button is provided below. Detailed descriptions of how to use these buttons to perform certain functions is provided throughout this manual. (See FIGURE 2 on page 32).

ETC Standby

- Used for taking the water heater in and out of standby mode. When the unit is in standby, “StbY” will be displayed. The tank will come on

at very low temperatures to prevent freezing. Also serves as an execute button in certain menus. Used to cancel setpoint selection without saving.

ETC Mode 

- Used for changing modes. Serves as a cancel button in certain menus. Used for navigating the options menu.

ETC Up 

- Used for increasing numeric settings. Also scrolls up when changing options. Can be held for auto scroll.

ETC Down 

- Used for decreasing numeric settings. Also scrolls down when changing options. Can be held for auto scroll.

ETC Away 

- Used for entering/exiting vacation override. Also used to set/unset child lock.

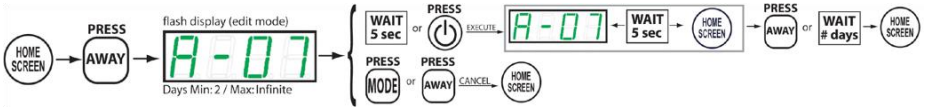
ETC Temperature Setpoint 

- The temperature setpoint represents the desired approximate temperature of the water inside the heater. The setpoint may be adjusted to your liking. There are pre-defined temperature limits to prevent extremely hot or freezing water in the unit and surrounding piping.
- To change the temperature set point for hot water output, from the home screen, press the ▲ AND ▼ buttons simultaneously on the controller. The setpoint temperature will flash quickly on the display. The temperature is adjusted up or down as the ▲ or ▼ buttons are pressed. Pressing and holding the ▲ or ▼ will allow fast scrolling through the temperatures. Once the desired temperature setting has been reached, press the ▲ AND ▼ buttons simultaneously to save the new setpoint. The setpoint will also auto save 5 seconds after single button presses. The temperature will NOT auto save after fast scrolling without pressing the ▲ AND ▼ simultaneously buttons to save the new setpoint. Pressing ⏻ will cancel the changes without saving. The display will now show the newly set temperature (e.g., “116”).

- To access the options menu, from the home screen, press and hold the MODE button until the display reads “diAg” (diagnostics), this is the first selection in the options menu.
- To navigate the options menu, continue to press the MODE button to cycle through the available options until the desired option is displayed. When the option to be changed is displayed, press the ▲ or ▼ buttons to enter the edit mode. When the display is flashing, the option may be altered by pressing the ▲ or ▼ buttons until the desired choice is displayed. To set the change, press the MODE button, or press the ⏻ button. The change will be made, and the controller will return the user to the options menu. To exit the menu at any time, let the display timeout after 5 seconds or press the ⏻ button.

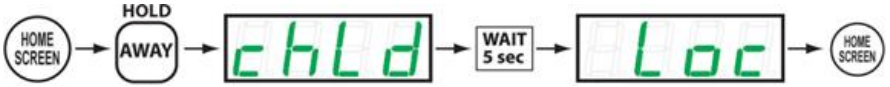
ETC Vacation Mode 

- Vacation mode deactivates the water heater for extended periods of time by overriding the current mode the water heater is set to. This is useful for saving energy when the water heater will not be used for a period of several days. The unit will maintain a water temperature of 50°F to prevent freezing.
- To activate vacation override, press the AWAY button on the controller. The display will show “A-07,” indicating the default vacation length of 7 days. The minimum vacation length is 2 days, and the maximum is 99 days. Use the ▲ or ▼ buttons to adjust the desired length of time to use vacation mode. The water heater will exit vacation mode automatically one day before the specified time period has elapsed. It is designed this way such that when the user returns from being away, hot water will be available.
- Once the desired time period is displayed, press the ⏻ button to save the selection. The water heater will now be in Vacation mode. The display will show “A-##”, where “##” is the number of days remaining in the vacation mode period.
- To manually cancel or end Vacation mode, press the AWAY button once.



ETC Child Lock

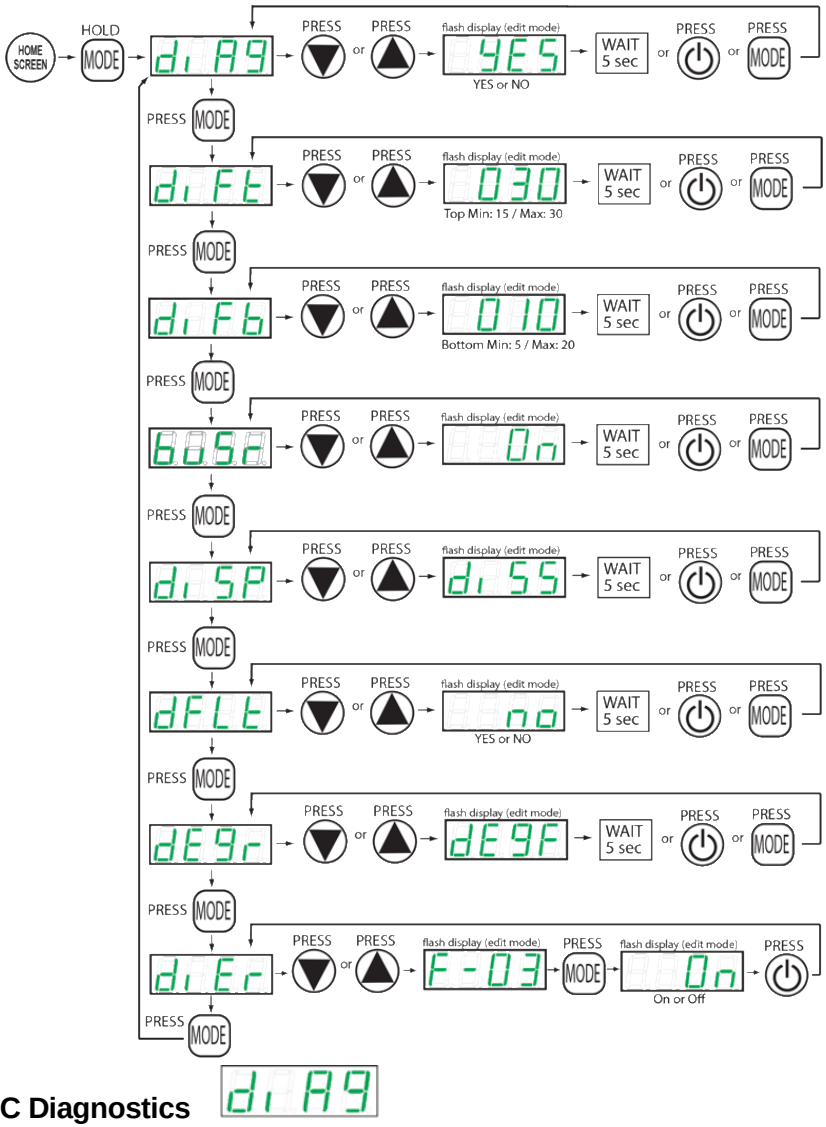
- Child Lock is essentially a button locking mechanism. If the user wishes, he or she may set the child lock, which will disrupt any future attempt to change modes, change the set point, etc. The user will be locked out of performing any function on the device until the child lock is released.
- To activate the Child Lock feature, press and hold the AWAY button until "chLd" is displayed on the screen. The controller is now locked.



- To deactivate the child lock, press and hold the AWAY button until "un" is displayed. You will be returned to the home screen.

ETC Controller Settings

- The Vaughn Electronic Temperature Control is equipped with various customizable options and settings. These options and settings are listed below and are explained in further detail. In the following pages.
  - Diagnostics
  - Differential (Top and Bottom)
  - Buzzer
  - Display
  - Defaults
  - Degrees
  - Disable Errors
  - Peak Demand Energy Control



ETC Diagnostics

- Enabling this option causes the control to perform various checks, including making sure each element works correctly. Any errors will be displayed after all of the tests are complete. The software version, such as “So3.4”, is displayed before normal operation resumes.

ETC Differential

- A temperature differential represents how far the water temperature can fall before the water heater must call for heat again. For example,

if the setpoint is 125°F and the differential is 10°F, then after satisfying at 125°F, the water temperature must fall to 115°F before the water heater will call for heat.

ETC Top Differential 

- The top differential controls the temperature differential in the upper section of the water heater. The top differential can be adjusted between 15 and 30°F. Typically, the top differential is larger than the bottom differential.

ETC Bottom Differential 

- The bottom differential controls the temperature differential in the lower section of the water heater. The bottom differential can be adjusted between 5 and 20°F. Typically, the bottom differential is smaller than the top differential.

ETC Buzzer 

- The buzzer is programmed to sound every 30 seconds whenever an error has been detected. It is highly recommended that the user leaves this buzzer on. However, this option allows the user to turn the buzzer off if desired.
- To turn the buzzer on or off, in the edit mode press the ▲ or ▼ buttons to alternate between “On” and “OFF”.

ETC Display 

- The display setting provides the ability to select whether the home shows the setpoint temperature (diSS) or the measured water temperature (diSt) inside the tank for the upper and lower sections. If “diSt” is selected, the home screen will cycle the display to show the top temperature (designated by a ‘t’ preceding the measurement) for 5 seconds, followed by the bottom temperature (designated by a ‘b’ preceding the measurement) for 5 seconds.

ETC Defaults 

- Enabling this option will reconfigure the controller to factory defaults. The factory defaults are shown below.
  - Temperature Setpoint: 125°F
  - Top Differential: 30
  - Bottom Differential: 10
  - Buzzer: On

- Display: Show Set Point
- Degrees: Fahrenheit
- Disable Errors: All enabled

- To set the unit back to factory defaults, in the edit mode press the ▲ or ▼ buttons to alternate between cancelling the operation, “no”, or resetting to default, “YES”.

ETC Degrees 

- The degrees option provides the user with the ability to switch between standard and metric temperature readings. The “dEgF” choice will set the temperatures to be displayed in Fahrenheit, and the “dEgC” choice will set the temperatures to be displayed in Celsius.
- To change the display units, in the edit mode press the ▲ or ▼ buttons to alternate between degrees Fahrenheit, “dEgF”, or degrees Celsius, “dEgC”. To set the change, let the display timeout after 5 seconds, press the MODE button, or press the ⏻ button.

ETC Disable Errors 

- The disable errors option allows for the use of external timer controllers to inhibit operation of the elements during certain times without removing power to the controller or otherwise affecting operation. The top and bottom element errors can be chosen individually to be turned on or off. If no external control is used, these errors should remain enabled. See ETC ERROR MESSAGES on page 34.

- To disable element errors, select “DiEr” in the options menu. Display the error F-03 to be disabled by pressing the ▲ or ▼ buttons. Select the displayed error by pressing the MODE button. Set display to OFF on the display with the ▲ or ▼ buttons. Select OFF by pressing the ⏻ button. Repeat for F-04.

ETC Peak Demand Energy Control

- Vaughn has been designing and programming streamlined and sophisticated energy controllers in conjunction with electric utility thermal storage programs for over 30 years, satisfying the utility's need for peak control while also offering a great deal of flexibility for the end user. Programs for the ETC are determined by the electric utility. Once programmed, the ETC automatically controls the water heater, saving energy without any worry or inconvenience to the

homeowner. If for some reason the homeowner wishes to override the system, an override may be accomplished with the simple push of a button.

- During Peak Demand time periods, “P” will be displayed before the setpoint temperature. The controller could be programed with a customer override allowing the peak period to be temporally overridden for a predetermined duration. If a customer override is available simply press the MODE button to allow full operation. “C” will be displayed while in override mode.

ETC Peak Mode 

ETC Customer Override 

E. OPTIONAL V-GRID CONTROL

- **NOTE: SPECIFIC UTILITY PROGRAMS ONLY**
- Used to control heating times by some utility companies.
- **Unlocking the Bottom Element Using V-Grid Activation Unit (AU):**
  - The V-Grid Activation Unit connects to the Electronic Temperature Control (ETC) and detects the activation status. In other words, it detects whether the device is “locked” or “unlocked”. Simply pushing the button on the AU will change the activation status, so the status will go from “locked” to “unlocked” or from “unlocked” to “locked”.
- **Connecting the V-Grid Activation Unit:**
  - The V-Grid Activation Unit connection is made by inserting the USB style connector into the USB style port on the left side of the electronic controller. These are not USB compatible connections. The V-Grid AU can be powered from the included DC power supply with output rated 12V, 0.5 Amps. The power supply is not required when connected to a control that has power.
- **V-Grid Activation Status Indicator:**
  - Red – Device locked
  - Green – Device Unlocked
  - Blinking Red – Not connected, trying to connect.
  - Blinking Green – Status change is in progress.
- **WIFI Status Indicator:**
  - Red LED on, not blinking: Power is on.
  - Green LED on, not blinking: The device is linked to the factory servers.
  - Green LED blinking once per second: The device is communicating with the factory servers.

FIGURE 1

Mechanical Thermostat Diagram

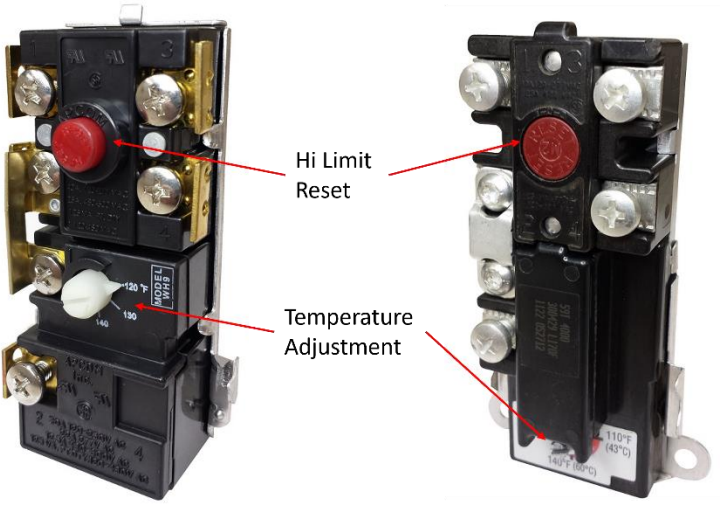


FIGURE 2

Electronic Temperature Control (ETC) Diagram

TROUBLESHOOTING

CAUTION: Make certain power to heater is OFF before removing jacket access panel(s) for any reason.

FOR QUALIFIED SERVICE PERSONNEL ONLY

Symptom	Probable Cause	Corrective Action / Remedy
Blank display	Circuit breaker tripped at source	Reset circuit breaker
	Faulty controller	If controller display is not lit and power is available at the controller, check wire connections then replace controller
No hot water	All hot water used	Wait for tank to recover
	High limit switch tripped	Reset high limit switch
	Heating element(s) inoperable	Run Diagnostics
	Check control display for error messages	See error codes in manual
Water too hot or too cool	Control setting too high or low	Change setting as required
	Control out of calibration	Adjust setting or replace*
	Insulation around elements not properly replaced	*Replace insulation properly

TABLE 1

CAUTION: For your safety, DO NOT attempt repair of electrical wiring, thermostat(s), heating elements or other operating controls. Refer repairs to qualified service personnel.

ETC ERROR MESSAGES

CAUTION: Make certain power to heater is OFF before removing jacket access panel(s) for any reason.

FOR QUALIFIED SERVICE PERSONNEL ONLY

When the Vaughn Electronic Temperature Controller detects an abnormal condition, the display will alternate between the home screen, ERR, and then the error code below.

ETC ERROR CODES

Symptom	Probable Cause	Corrective Action / Remedy
F-01 or F-02	Indicates that the controller's water temperature sensor has experienced an error. F-01 indicates top sensor (red sensor wires), F-02 indicates bottom sensor (black sensor wires)	Turn off the power to the unit. Examine the connections on the controller to verify that connector is attached, and then repower the unit. If the problem persists, contact your local service professional
F-03 or F-04	Indicates that one or both elements do not draw power when indicated. F-03 indicates top element failure, F-04 indicates bottom element failure	Turn off the power to the unit. Examine the connections in the junction box and at the high limit and element terminals. Check resistance of the elements. Replace elements if needed
F-05	F-05 indicates there is no current through either element	Turn off the power to the unit. Examine the connections in the junction box and at the high limit and element terminals. Check for a tripped or faulty high limit. Check external timer switch if present. If the problem persists, contact your local service professional

TABLE 2

MAINTENANCE

Properly maintained, your water heater can provide years of dependable, trouble-free service. It is suggested that the purchaser follow the preventive maintenance program outlined below.

A. CONTROLS

- A periodic inspection of the operating controls, heating elements and wiring should be made by qualified service personnel.
- The temperature of the water should be tested periodically at the faucet to be sure the controller is working properly.

B. ANNUAL INSPECTION

- Lift test lever on relief valve and let water run through valve for a period of approximately 10 seconds.
- Inspect element fittings for leakage.
- Check for loose electrical connections (Turn off power first).
- Flush tank at 10 years (or earlier if needed).

C. DRAINING THE HEATER

- **CAUTION: Shut off all power to the heater before draining water.**
- To drain the tank, a hot water faucet must be opened to admit air to the tank.
- Close valve on the cold-water line to the heater.
- Attach a hose to the drain on the heater and direct to a drain.

D. LONG TERM SHUT DOWN

- If the water heater is to remain idle for an extended period of time, the power and water to the heater should be turned off to conserve energy.
- The water heater should be drained if it might be subjected to freezing temperatures.
- After a long shutdown period, qualified service personnel should check the heater's operations and controls.

E. EMERGENCY

- Should the heater be subject to flood, fire, or other damaging conditions, turn off the power and water to the heater.
- **DO NOT place the water heater in operation again until it has been thoroughly checked by qualified service personnel.**

REPLACEMENT PARTS

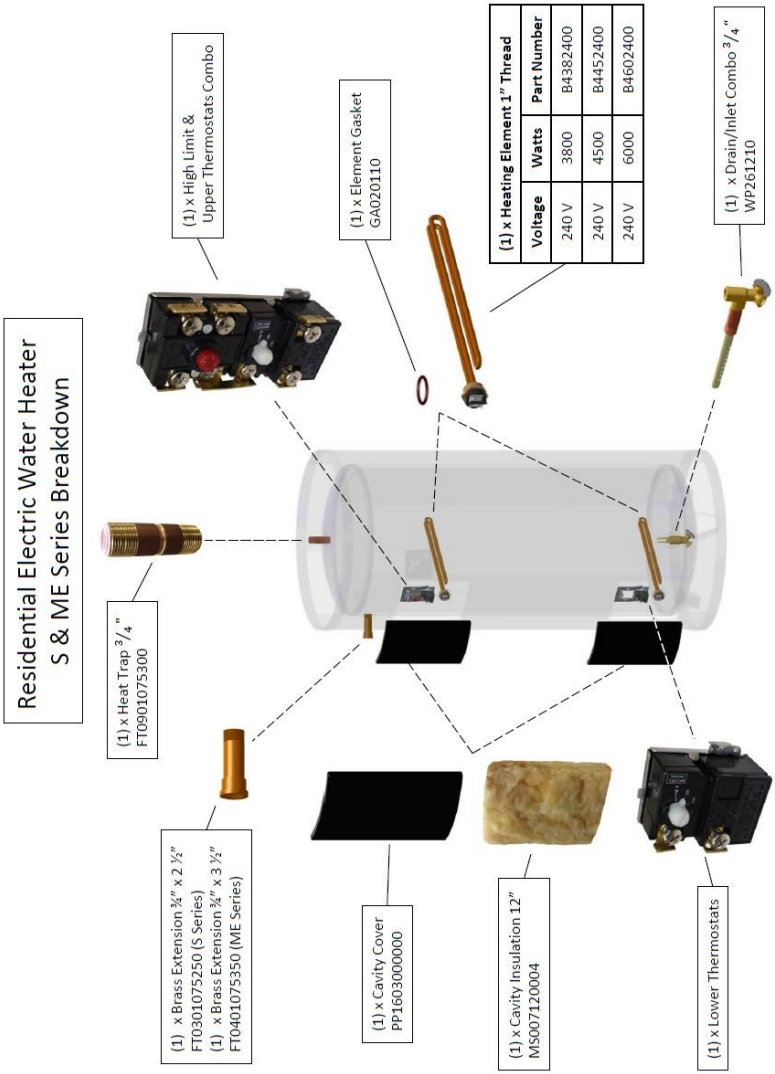


FIGURE 3

HOW TO OBTAIN SERVICE ASSISTANCE

Vaughn Thermal Corporation does not have a service department or personnel to service your heater in the field. A qualified installer or service technician must do all service work. Therefore, if you have any questions about your new water heater concerning service adjustment, repair, routine maintenance, or replacement - **first contact your installer, plumbing contractor, or service agency.**

In the event that the contractor is unable to help, refer to the telephone directory commercial listings for qualified service assistance.

If neither action has solved your problem, please have your plumbing contractor contact us for assistance.

CUSTOMER RELATIONS DEPARTMENT
General@vaughncorp.com
978-462-6683

VAUGHN THERMAL CORPORATION
26 OLD ELM STREET
P.O BOX 5431
SALISBURY, MA 01952

When contacting Vaughn, the following information should be made available:

1. **The model and serial number of the water heater as listed on the rating plate on the heater.**
2. **Address where water heater is installed.**
3. **Name and address of dealer from whom the heater was purchased and installer's name and address.**
4. **Date of original installation and any service work performed since then.**
5. **Details of the problem as you can best describe.**
6. **List of people who have been contacted regarding the problem.**

WARRANTY

Ten (or Five) Year Limited Tank Replacement Policy
One Year Limited Parts Warranty

Vaughn Thermal Corporation, (hereinafter called the Company) offers the following Limited Warranty and Tank Replacement Policy to the original purchaser/owner of this residential water heater.

This Limited Warranty and Tank Replacement Policy is not transferable beyond the original purchaser/owner and is not valid if the tank is removed from initial installation site. The Company reserves the right to require proof of purchase as a condition of this warranty. Excludes any implied warranty of merchantability or fitness for any particular purpose. This limited Warranty is the only Warranty for this unit given by the Company. No one is authorized to make any other warranties on behalf of the Company. ANY IMPLIED WARRANTIES, INCLUDING MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE, SHALL NOT EXTEND BEYOND THE APPLICABLE WARRANTY PERIODS SPECIFIED PREVIOUSLY. THE Company SOLE LIABILITY, WITH RESPECT TO ANY DEFECT, SHALL BE AS SET FORTH IN THIS LIMITED WARRANTY, AND ANY CLAIMS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING DAMAGE FROM WATER LEAKAGE) ARE EXCLUDED.

LIMITED WARRANTY

DURATION: The warranty is effective for (1) one year beginning with the date of original installation and installed in a single-family dwelling. At the time the claim is filed, if the original purchaser cannot provide an original installation sales receipt, deed or equivalent document in the case of a new home purchase, this warranty shall begin from the date of manufacture as indicated by the serial number. If the heater is installed anywhere other than a single-family dwelling the warranty is (1) year beginning from the date of original purchase. At the time the claim is filed, If the original purchaser cannot provide an original sales receipt, deed, or equivalent document in the case of a new home purchase, this warranty shall begin from the date of manufacture as indicated by the serial number.
COVERAGE: The warranty covers any component part of the residential water heater proven to be defective in workmanship or material. Recovery under the terms of this agreement is subject to prior approval by the company.
COMPANY OBLIGATION: Repair or replacement is the option of the Company and constitutes the fulfillment of **ALL** obligations of the Company hereunder.
LIMITATION: All repairs or replacements will be made F.O.B. the Company. The purchaser must pay for transportation service, labor, installation, administrative fees, or other costs involving the repair or replacement of such component parts.
YOUR ACTION: When you discover a defect, immediately notify the dealer from whom the heater was purchased. If you cannot locate the dealer, contact the Company.

TANK REPLACEMENT POLICY

DURATION: The warranty is effective for (10) ten years beginning with the date of original installation and installed in a single-family dwelling. Exception: (5) years for commercial use, see Limitations below. If the original purchaser cannot provide an original installation sales receipt, deed, or equivalent document in the case of a new home purchase, this warranty shall begin from the date of manufacture as indicated by the serial number.
COVERAGE: Replacement policy covers only the storage tank for leaks caused by the corrosive effects of the water under normal and proper use. Recovery under the terms of this agreement is subject to prior approval by the company. The tank replacement policy excludes any performance warranty implied or specific merchantability and fitness for its intended use.

COMPANY OBLIGATION: Repair of the original tank or replacement of the entire heater with a new comparable model is the option of the Company and constitutes the fulfillment of all the obligations of the Company hereunder. In replacing or repairing the residential water heater, the Company reserves the right to make such changes in details of design, construction or material as shall in their judgment constitute an improvement of former practices.

REPLACEMENT: When a replacement is made under the terms of this policy, the replacement unit will have a policy of replacement only for the remaining time under the original policy. The Company reserves the right to require the return of the defective unit at the expense of the purchaser.

LIMITATION: The duration of the tank replacement policy on the tank assembly shall be reduced to a period of five years if (1) the purchaser is a business, partnership, or corporation, or if (2) the water heater is used for a commercial, institutional, industrial, non-residential, or multi-application. All repairs or replacements will be made F.O.B. the Company. The purchaser must pay for transportation, service, labor installation, administrative fees or other costs involving the repair or replacement of such part.

YOUR ACTION: When you discover a defect, immediately notify the dealer from whom the heater was purchased. If you cannot locate the dealer, contact the Company.

EXCLUSIONS AND LIMITATIONS

Limited Warranty and Tank Replacement Policy are valid only if you comply with the following conditions and limitations:

1. The water heater must be correctly installed according to the installation manual provided with the unit and all applicable local and national codes.
2. Proper safety practices such as but not limited to a properly sized drain pan.
3. The unit must be operated within the factory calibrated temperature limits and water pressure not exceeding 80 psi static pressure. Any failure or malfunction that results from improper or negligent operation, accident, abuse (including freezing), misuse, unauthorized alteration or improper maintenance is specifically excluded, fire, lightening, acts of God, and the like.
4. Any failure or malfunction that results from failure to keep the tank full of potable water, free to circulate at all times, and free of damaging water sediment or scale deposits, is specifically excluded. In areas where adverse water conditions are suspected (i.e., calcium and other minerals), it is essential that the water be tested, and appropriate action be taken to prevent damage to the water heater.
5. This Limited Warranty and Tank Replacement Policy specifically excludes any implied warranty of merchantability or of fitness for any particular purpose, as well as any performance warranty.
6. Installed in the United States, or Canada
7. Sized in accordance with proper sizing techniques for residential water heaters.
8. Connected to the proper voltage per rating plate.
9. Installed with no attempted, nor actual modification or alteration of the water heater's design in any way, including but not limited to, the attachment of non-company approved appliances or equipment, including any additional aftermarket equipment introduced into the sealed system.
10. Units with their rating plate removed.

IN NO EVENT SHALL THE COMPANY BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES WHATSOEVER.

Some states do not allow the exclusion or limitation of implied warranties or of liability for incidental or consequential damages, so the above limitation(s) or exclusion(s) may not apply to you.

The following information should be noted at time of installation and retained for future reference.

Model No: _____

Serial No: _____

Date Installed: _____

Dealer's Name: _____

Address: _____

City: _____

State: _____Zip: _____

VAUGHN
a nudyne company

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