

**INSTALLATION, OPERATION, AND
MAINTENANCE MANUAL FOR
HYBRID ELECTRIC HEAT PUMP
WATER HEATER**

Hubbell™
ELECTRIC HEATER COMPANY

BASE MODEL “PBX”



**HUBBELL
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-- IMPORTANT --

Always reference the full model number and serial number when calling the factory.



WARNING / CAUTION

1. Tank is to be completely filled with water and all air is to be vented before energizing. Do not turn on 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 heater is placed in operation.
3. Safety relief valve must be installed in tapping provided.
4. The refractory material used in heating elements may absorb some moisture during transit, periods of storage, or when subjected to a humid environment. This moisture absorption results in a cold insulation resistance of less than twenty(20) megohms. If this heater has been subjected to the above condition, each heating element must be checked for insulation resistance before energizing. A low megohm condition can be corrected by removing the terminal hardware and baking the element in an oven at 350°F -700°F for several hours or until the proper megohm reading is obtained.
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 potentials may exist even when the power supply is off. To avoid casualties, always turn the power supply safety switch to off, turn the charge or ground the circuit before performing any maintenance or adjustment procedure.
6. The unit is designed to operate at pressure not more than 150 psi.
7. 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 your local plumbing and electrical inspectors for proper procedures and codes. If you cannot obtain the required information, contact the company.
8. In the event of overheating, fire, flood, or physical damage, turn off all power to your water heater. Do not power the heater until it been examined by a trained professional.
9. 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

Safety Information and Precautions:

Please read the following safety information before proceeding:



- 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 temperature at the water heater.
- Feel water before bathing or showering.
- Temperature limiting valves are available, see manual.

The temperature of the water in the heater is regulated by an adjustable, automatic, temperature control which uses surface mounted thermistors located behind the jacket access panels. These automatic controls are set at the factory to maintain a water temperature of 120°F. Although these controls are designed to industry standards, they can fail to control temperature properly without any notice, and therefore should be tested periodically for your protection.

To perform the test: 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.

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OPERATING PRINCIPLE, SPECIFICATIONS, AND PERFORMANCE

How the Hubbell Heat Pump Water Heater Works

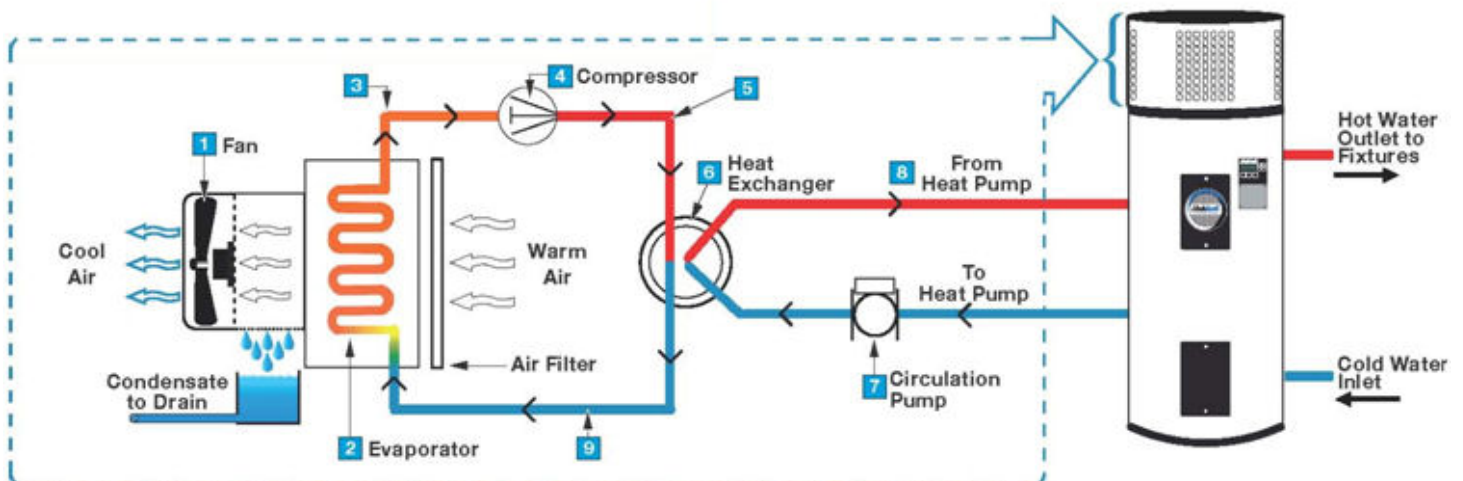
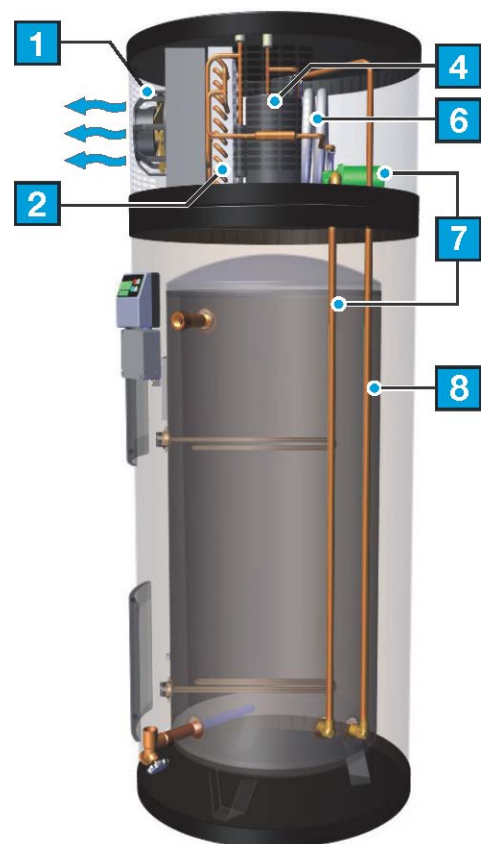
The Hubbell Model PBX Heat Pump Water Heater uses a small amount of electricity to transfer heat from the air to water. In comparison, traditional electric water heaters use resistive heating elements to directly heat the water. A benefit of a the heat pump water heater is that it uses less than half the electricity of a traditional electric water heater to produce the same amount of hot water and therefore the Hubbell Model PBX is significantly more energy efficient compared to a conventional electric water heater.

In principle, a heat pumps works like a refrigerator in reverse. A refrigerator moves heat from inside the refrigerator and transfers that heat energy to the surrounding room. A heat pump water heater on the other hand pulls free and essentially unlimited heat from the surrounding air and transfers that heat to the water stored in the tank.

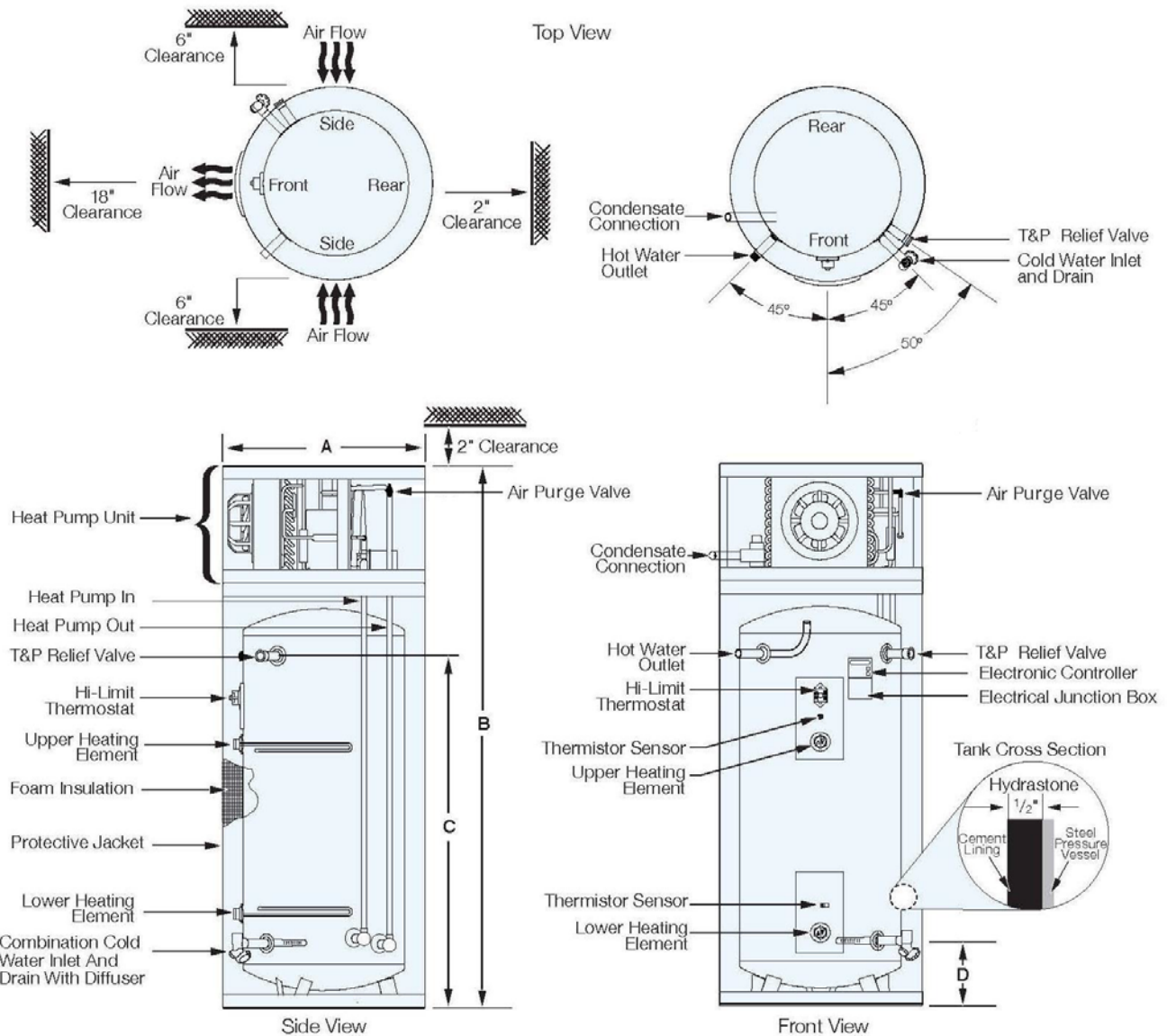
The Hubbell Model PBX Heat Pump Water Heater can pull heat out of air as cool as 40°F, and if it cannot provide enough heating capacity to meet demand, the water heater includes back-up resistive heating elements to ensure the unit provides sufficient hot water. In addition, the heat pump process of removing heat from the air and transferring it to the water results in the exhaust of cooler dryer air, with as much as 0.4 gallons per hour of “free” dehumidification provided by the heat pump while the unit is heating water.

Heat Pump Functions with Operational Diagram:

1. The built in fan draws room air into the heat pump compartment and across an evaporator coil, and exhausts cooler and slightly dryer (dehumidified) air.
2. The evaporator coil captures heat energy in the air and transfers that energy to a specially formulated CFC free refrigerant contained within the evaporator.
3. The refrigerant changes from a liquid to a gas as it gets warmer.
4. The refrigerant, now as a warm gas, exits the evaporator and passes into a compressor.
5. The warm gas is compressed, causing it to become a superheated hot gas and then flows to the heat exchanger.
6. The heat exchanger transfers heat energy from the superheated hot gas to the cold water from the tank.
7. The pump circulates cold water from the tank through the heat exchanger resulting in a continuous transfer of heat energy from the superheated gas to the water.
8. Hot water exits the heat exchanger and is stored in the tank.
9. The superheated gas condenses back to a liquid and the process is repeated.



Outline Dimensions



Model Specific Dimensional Data

Base Model Number	Storage Capacity (Gallons)	Dimensions (Inches)				Shipping Weight (lbs.)
		Overall Diameter "A"	Overall Height "B"	Floor to Relief Valve & Hot Water Outlet "C"	Floor to Cold Water Inlet "D"	
PBX40SL	40	28	49	26	9	270
PBX50SL	50	25	66	43	9	325
PBX65SL	65	28	63	40	9	365
PBX80SL	80	28	73 1/2	50	9	440
PBX120SL	120	30	84	61	9	525

Options

- 1 1/2" Male NPT inlet and outlet water connections.
- Corrosion-Resistant (Copper-Alloy, Type 304L or Type 316L stainless steel) storage tank for maximum life.
- ASME tank construction.
- Tank installed heat exchanger for use with solar or radiant heating systems.
- Alternate single and 3 phase voltages, alternate wattages or 50 Hz available.
- Condensate removal pump (120V plug-in) to remove and lift condensate to drain.

Specifications

Tank:	Hydrastone Cement Lined Steel	Hi-Limit:	190°F Manual Reset
Pressure Rating:	150 psi WP, 300 psi TP	First Hour Rating:	(Gallons)
Storage:	40, 50, 65, 80, 119 Gallons	PBX40SL	46
Orientation:	Vertical	PBX50SL	61
Voltages:	208-240 Volt AC	PBX65SL	70
Phase:	Single	PBX80SL	82
Frequency:	60 Hz	PBX120SL	120
Inlet Size:	¾" Female NPT	Standby Heat Loss:	(°F/hr)
Outlet Size:	¾" Male NPT	PBX40SL	0.45
Drain Size:	¾" GHT	PBX50SL	0.36
Condensate Size:	⅜" Tube	PBX65SL	0.35
Relief Valve Size:	¾" Female NPT	PBX80SL	0.28
Relief Valve Type:	T&P, 210°F, 150 psi	PBX120SL	0.28
Heat Pump:		Energy Factor:	2.33
Refrigerant:	R426A (CFC Free)	COP:	2.36
ODP:	0	Average Power Consumption:	
GWP:	1349	High Fan:	680 Watts
Over Pressure Safety:	Manual Reset	Low Fan:	614 Watts
Field Chargeable:	No	Electric Elements:	Incoloy Sheathed
Ambient Air:			3800W @ 240V
Air Flow (High Fan):	450 CFM	Insulation:	3" Polyurethane Foam
Air Flow (Low Fan):	250 CFM	Sound Level:	62db Average @ 3 Feet
Air Filtration:	Washable / Removable	Warranty:	
Temperature Range:	40-110°F	Tank:	10 Years
Thermostat Range:	50-160°F (°F or °C) ±3°F	Parts:	6 Years
Error Indication:	Visual and Audible	Approvals:	cULus, ENERGY STAR
Demand Response			Qualified
Capable:	Yes	Jacket:	High Impact Colorized
Child Lock Capable:	Yes		Composite
		Color:	White with Black Trim

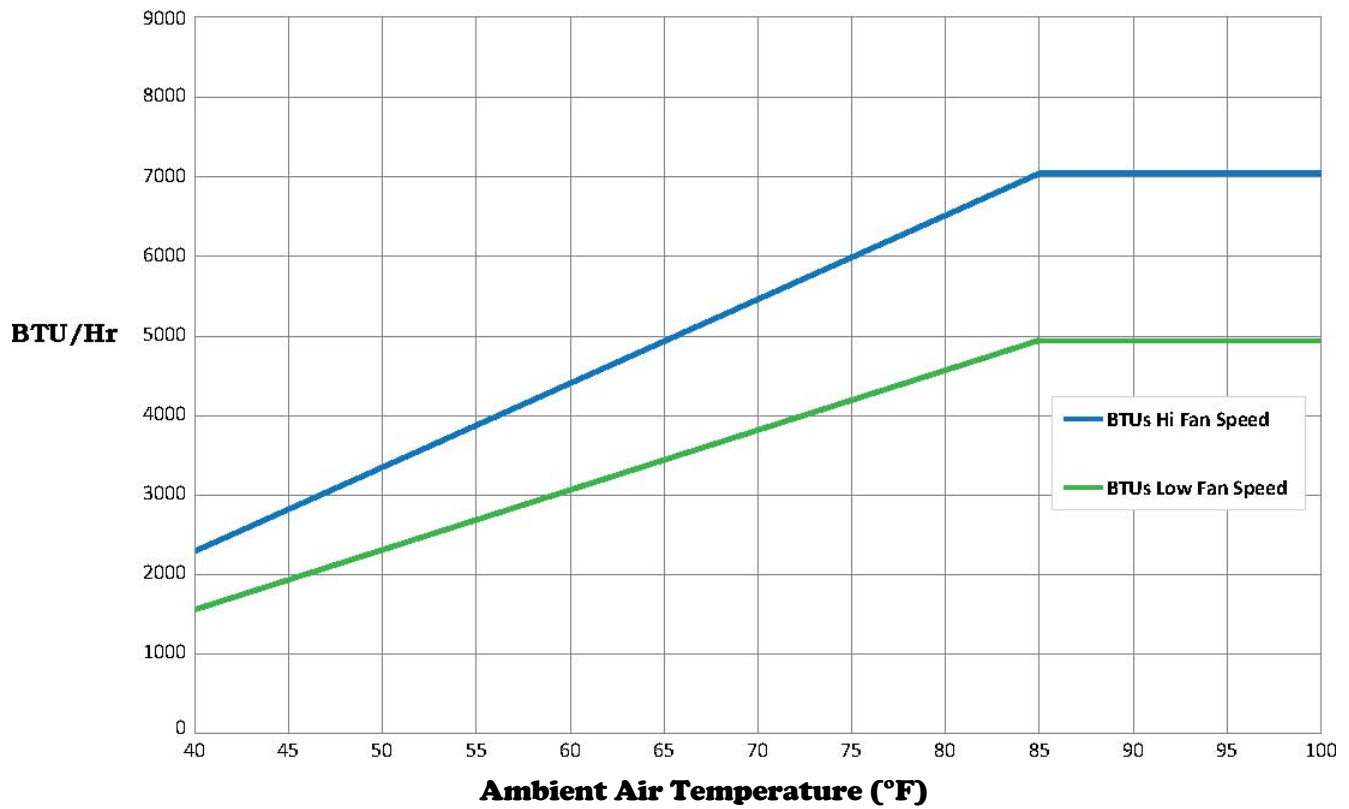
Electrical

Amperage Rating Chart (Amps)				
Supply Voltage	Total Maximum Amp Draw in Various Operating Modes			
	Economy	Hybrid	Electric	Super
240V	2.6	15.8	15.8 (3800 Watts)	18.4
220V	2.8	14.5	14.5 (3200 Watts)	17.3
208V	3.0	13.7	13.7 (2850 Watts)	16.7

Overcurrent circuit protection rated 25 amp minimum is required. Reference local, state, and national codes.

Performance

These units are designed to meet or exceed ANSI (American National Standards Institute) requirements and have been tested according to D.O.E. test procedures and meet or exceed the energy efficiency requirements of NAECA, ASHRAE standard 90, ICC Code and all state energy efficiency performance criteria for energy consuming appliances.



Energy Consumption Chart

Annual Energy Consumption (EST)										
Ambient Air Temperature	Energy Factor (EF)	Coefficient of Performance (COP)	Annual Energy Consumption and Operating Cost in Various Operating Modes							
			Economy		Hybrid		Electric		Super	
			kW-hrs	Operating Cost \$	kW-hrs	Operating Cost \$	kW-hrs	Operating Cost \$	kW-hrs	Operating Cost \$
50°F	1.39	1.42	3159	\$336	3159	\$336	4671	\$497	4368	\$465
70°F	2.33	2.36	1884	\$201	1884	\$201	4671	\$497	3851	\$410
90°F	3.07	3.07	1430	\$152	1430	\$152	4671	\$497	3527	\$376

Energy Factor and Average Annual Operating Costs based on 2007 D.O.E. (Department of Energy) test procedures. D.O.E. national average fuel rate electricity 10.65¢/kW·hr. Energy Factor (EF) based upon heater operating in Hybrid mode.

Recover Rating Chart

Continuous Recovery Rating (GPH)												
Ambient Air Temp	Continuous Recovery Rating (GPH) in Various Operating Modes											
	Economy			Hybrid			Electric			Super		
	60°F ΔT	70°F ΔT	80°F ΔT	60°F ΔT	70°F ΔT	80°F ΔT	60°F ΔT	70°F ΔT	80°F ΔT	60°F ΔT	70°F ΔT	80°F ΔT
50°F	6.5	5.6	4.9	25.9	22.2	19.4	25.9	22.2	19.4	32.4	27.8	24.3
70°F	10.9	9.4	8.2	25.9	22.2	19.4	25.9	22.2	19.4	36.8	31.6	27.6
90°F	14.2	12.2	10.6	25.9	22.2	19.4	25.9	22.2	19.4	40.1	34.4	30.0

Continuous Recovery rating based upon 240V power supplied to heater and fan operating in high speed mode. ΔT represents the °F temperature rise for hot water.

Heating Capacity Chart

Heating Capacity Chart (BTU/Hr)				
Ambient Air Temp	BTU/Hr Rating in Various Operating Modes			
	Economy	Hybrid	Electric	Super
50°F	3,240	12,965	12,965	16,205
70°F	5,400	12,965	12,965	18,365
90°F	7,020	12,965	12,965	19,985

Heating Capacity based upon 240V power supplied to heater and fan operating in high speed mode.

INSTALLATION



WARNING / CAUTION

DO NOT TURN ON THE ELECTRIC POWER SUPPLY to this equipment until heater is completely filled with water and all air has been released. *If the heater is NOT filled with water when the power is turned on, the heating elements will burn out.*

For protection against excessive pressures and temperatures, local codes require the installation of a temperature-and-pressure (T&P) relief valve certified by a nationally recognized 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. THE CUSTOMER IS RESPONSIBLE TO PROTECT PROPERTY AND PERSONNEL FROM HARM WHEN THE VALVE FUNCTIONS.

All water heaters have a risk of leakage 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.

Water Heater Placement

1. Place the heater on a solid foundation in a clean, dry location nearest to the point of most frequent hot water use. If the heater is to be raised off the floor, the entire bottom of the heater should be supported by a solid surface.
2. The water heater must be installed with the minimum clearances as shown on page 5.
3. Do not install in an area where flammable liquids or combustible vapors are present.
4. The water heater should be protected from freezing and waterlines insulated to reduce energy and water waste.
5. The space that the water heater is installed must be no less than 10' x 10' x 7' high (700 cubic feet). If a smaller space is used, there must be louvers installed in the space that will allow for 450 CFM air flow.
6. The installation location must not be cooler than 40°F. Locations with warmer ambient air (ex. furnace rooms) are more advantageous as they provide abundant "free" heat.
7. The heat pump dehumidifies the air and as a result produces condensate which must be piped to a drain or outdoors.

Piping Installation

NOTE: The most effective means for preventing deterioration from accelerated corrosion due to galvanic and stray current is the installation of dielectric fittings/unions. The installation of these fittings is the responsibility of the installing contractor.

1. Connect the cold water inlet and hot water outlet to the appropriate connections as shown; refer to the drawing for location and sizes.
NOTE: Certain models are supplied with a flow measuring device (flowmeter) and temperature measuring device (thermistor) to be installed on the cold water supply side. These items are shipped pre-wired into the unit and stored in the heat pump compartment. The flowmeter should be installed in-line with the cold water supply piping with the arrow pointing toward the water heater. The thermistor should be secured to the outside of the cold water piping and covered with insulation.
2. Install the combination temperature and pressure safety relief valve in the tapping provided. Note that this is required by law for safety considerations.
3. Install a relief valve overflow pipe to a nearby floor drain. CAUTION: No valve of any type should be installed between the relief valve and tank or in the drain line.

Filling the Water Heater

1. Completely close the drain valve.
2. Open the highest hot water faucet to allow all air to escape from piping.
3. Open the valve to the cold water inlet and allow the heater and piping system to completely fill, as indicated by a steady flow of water from the open faucet.
4. Close the faucets.
5. Lift the top cover of the heat pump unit.
6. Carefully open the Air Purge Valve at the top of the heat pump unit to let air escape. See the Outline Dimensions illustration for the location.
7. Fully tighten Air Purge Valve.

Electrical Installation

1. Enter junction box with properly sized feeder leads. Note that overcurrent circuit protection is required. For the standard model the overcurrent protection must be rated 25 amp minimum.
2. Connect these power leads to wires enclosed in junction box with wire nuts.
3. All other electrical connections are made at the factory; therefore, no other electrical connections are necessary.

Final Checks

1. Check all connections for tightness.
2. Ensure that all the above steps are completed.
3. After the water is heated for the first time, monitor the water temperature as described in the Scheduled Maintenance section.

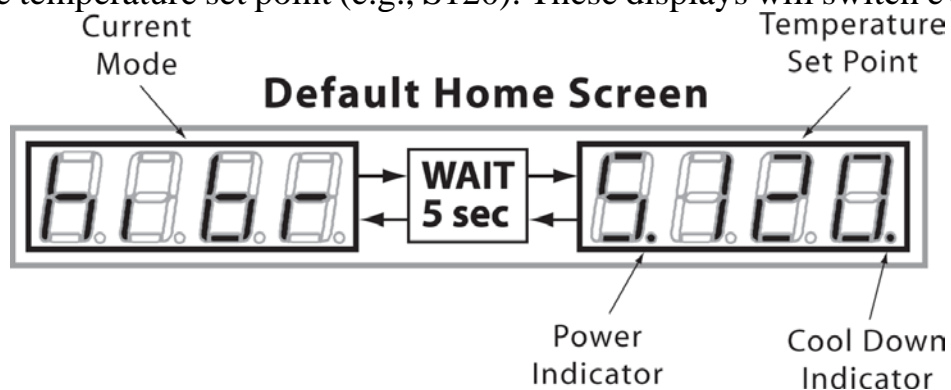
CONTROLLER OPERATION

About the Controller

The Hubbell Heat Pump Water Heater Controller provides the user with the ability to control and customize the operation of their heat pump 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.

Powering up your Heat Pump Water Heater for the first time

When the unit is first powered up, the default home screen is shown, see diagram below. This screen consists of two alternating displays; one shows the current mode (e.g., hibr), and the other shows the temperature set point (e.g., S120). These displays will switch every 5 seconds.



By default, the Hubbell Hot Water Heat Pump comes programmed with a temperature setpoint of 120°F and set to hybrid mode (“hibr”).

The Home Screen

The home screen provides a quick reference to the current status of the water heater and can be modified to fit the user’s preference. If desired, the temperature readouts can be displayed in Celsius (see “**Changing the Temperature Scale**”) and the user has the option to display

either the temperature set point, denoted by a capital “S” preceding the set point, or the current temperature conditions inside the tank, denoted by “t” and “b” preceding the top and bottom temperatures, respectively (see “**Changing the Home Screen**”).

If an error condition is detected, the error code is displayed until the error condition is resolved. There are several error conditions which may result in this behavior (see “**Maintenance Alerts and Procedures**”).

As shown in the above diagram, the home screen also has two indicators; power and cool down. The power indicator denotes whether active heating of the water is taking place. If the power indicator light is not visible, the water in the tank has reached the desired temperature, and thus no active heating is taking place. A blinking power indicator light means that the unit has not yet reached the temperature set point, and that current is being drawn to power the heating elements. A solid power indicator light means that the unit is calling for power, but is not detecting the proper amp draw to the elements. This may indicate a problem with the elements or that only the heat pump is running (normal for Hybrid and Economy modes). Set the tank to Electric or Super mode to check operation of both elements.

When the compressor is running, pressure builds up within the heat pump module. The cool down indicator shows whether or not the heat pump has had sufficient time to allow the pressure within the system to stabilize. The duration of this cool down period is 10 minutes and starts from the time when the compressor turns off. If the cool down indicator light is not visible, either the cool down period is complete, or the unit does not currently require the use of the compressor. A solid cool down indicator light indicates that the unit requires the use of the compressor, and is currently within the cool down period.

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.



Standby: Used for taking the water heater in and out of standby mode. When the unit is in standby, “STBY” will be displayed. This is not considered OFF because the tank will come on at very low temperatures to prevent freezing. Also serves as an execute button in certain menus.



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



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



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



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



Max Heat: Used for entering / exiting max heat override.



Fan Off: Used for entering / exiting fan off and fan speed overrides.

Operating Modes

The Hubbell Heat Pump Water Heater is equipped with four operating modes and four temporary settings. A brief overview of each mode and setting is listed below:

**(Economy):**

Economy mode allows only the heat pump portion of the unit to operate; the electric heating elements will not operate in this mode. This is the most efficient mode, but may not meet high demand situations.

**(Hybrid):**

Hybrid mode makes efficient use of the electric heating elements. In Hybrid mode, the heat pump provides the vast majority of the heating capacity. The top electric element will be automatically switched on only when necessary to meet high demand situations.

**(Electric):**

Electric Mode disables the heat pump unit, allowing only the electric heating elements to heat the water in the tank.

**(Super):**

Super mode allows either of the electric elements as well as the heat pump to function simultaneously, providing the fastest recovery option for the unit. This is the least efficient mode, but provides the fastest heating rate high demand situations.

**(Vacation Override):**

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. Using only the heat pump, the unit will maintain a water temperature of 50°F to prevent freezing.

**(Fan Off Override):**

The Fan Off setting allows the user to temporarily stop the heat pump portion from operating for a specified number of hours. This is useful if the water heater is located in a populated part of a building, and the user wishes to temporarily eliminate any noise or airflow created by the heat pump unit.



or



**(Fan Speed Override):**



The Fan Off button can also be used to temporarily override the current fan speed setting. This is useful for temporarily reducing, but not eliminating, any noise created by the heat pump unit.




**(Max Heat Override):**

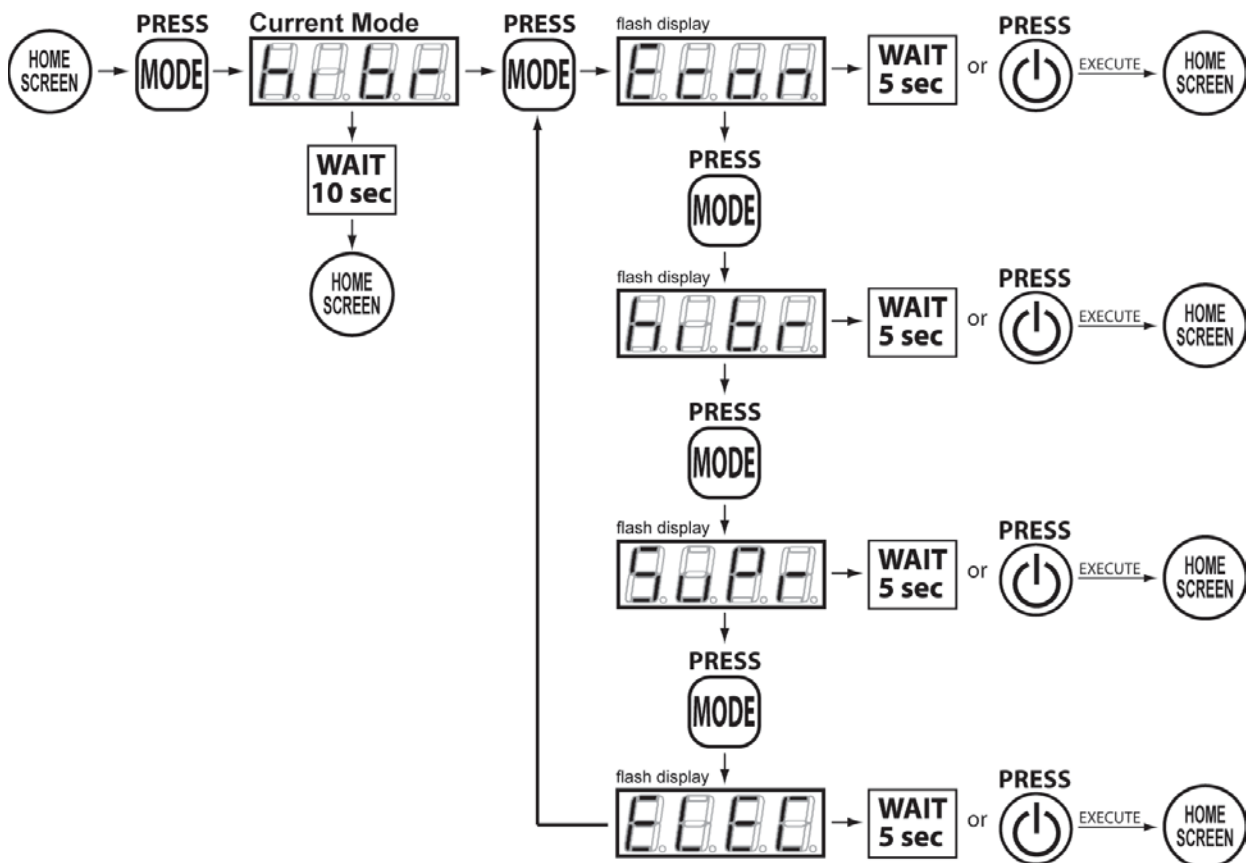
The Max Heat setting will override the heater's current mode setting and temporarily change to Super Mode, which will activate one of the electric heating elements as well as the heat pump unit for a set period of time. This is useful if the user is expecting high demand hot water usage for a specified number of hours.



Changing the Mode






To display the current mode, from the home screen, press the  button once. This will display the current mode the water heater is operating on for 10 seconds. This feature is useful if the home screen is displaying an error condition. Allow the display to timeout, or press any button other than the  button to return to the home screen.


To switch between modes, from the home screen, press the  button once. This displays the current mode. Before 10 seconds elapses, press the  button again. The display will show a



flashing “Econ” (economy). If this is the desired mode, either allow the display to timeout by not pressing any buttons for 5 seconds or press the  button to set the mode. If this is not the desired mode, within 5 seconds continue to press the  button until the desired mode is selected (flashing). Press the  button or allow the 5 second timeout to elapse to set the mode.

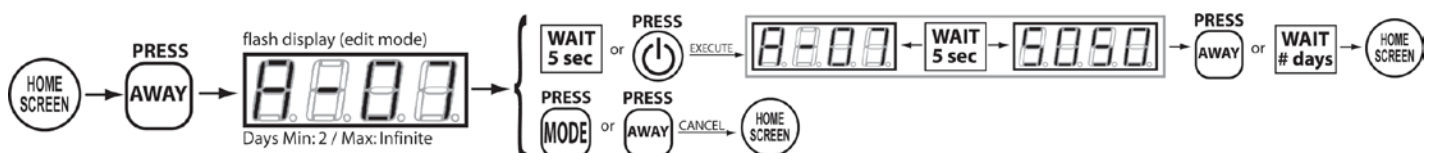


Note: To cancel out of the mode select menu without changing the mode, press any button other than the  or  buttons.

To activate vacation override, press the  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 indefinite. Use the  or  buttons to adjust the desired length of time to use vacation mode. To set the water heater to vacation mode for an indefinite period, use the  or  buttons to adjust the display until “AOFF” is visible.

Once the desired time period is set, press the  button or allow the 5 second timeout to elapse. The water heater will now be in Vacation mode. While in Vacation mode, the display will alternate between “A-##”, where “##” is the number of days remaining in the vacation mode period and “S.050” to indicate the maintained minimum temperature of 50°F. If the water heater was set to vacation for an indefinite period, the display will read “OFF”, but the tank will in fact maintain the 50°F minimum temperature.

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. To manually cancel or end Vacation mode, press the  button once. The display should now alternate between “S.###” (the previous temperature setpoint) and the mode the unit was set to prior to the start of Vacation mode (e.g., “hibr”). If the water heater has been placed in vacation mode for an indefinite period of time (“AOFF”), the unit will have to be manually activated. To do this, press the .

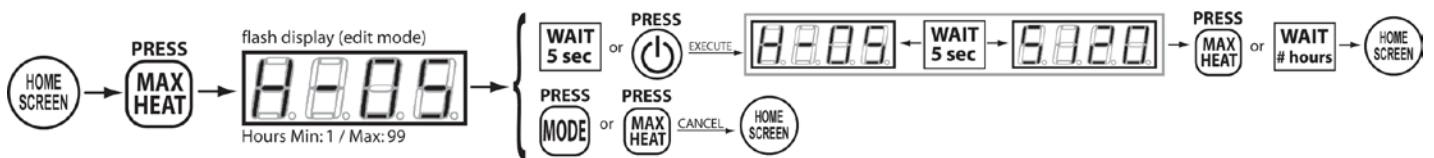


Note: Use the ▲ or ▼ buttons to modify the setting or value on any screen designated as an “edit mode” display.

To activate the Max Heat override, press the **MAX HEAT** button on the controller. The display should show “H-05,” indicating the default time setting of 5 hours. The minimum duration for this override is 1 hour and the maximum is 99 hours. To adjust the Max Heat duration, use the ▲ or ▼ buttons on the controller until the display indicates the desired amount of time in hours (e.g., “H-10” for a 10 hour period of Max Heat).

Once the desired time has been set, begin the Max Heat feature either by allowing the screen to time out after 5 seconds, or by pressing the **EXECUTE** button. While the Max Heat feature is engaged, the display will alternate between “S.###,” where “###” is the temperature setting for the unit (e.g., “S.120” for a setting of 120 degrees) and “H-##,” where “##” is the number of hours remaining in the Max Heat session.

The Max Heat feature will automatically turn off after the specified number of hours has elapsed. To end the session prematurely, press the **MAX HEAT** button once. The display should now alternate between the unit’s temperature setting (e.g., “S.120”) and the unit mode in use prior to Max Heat, (e.g., “hibr”).

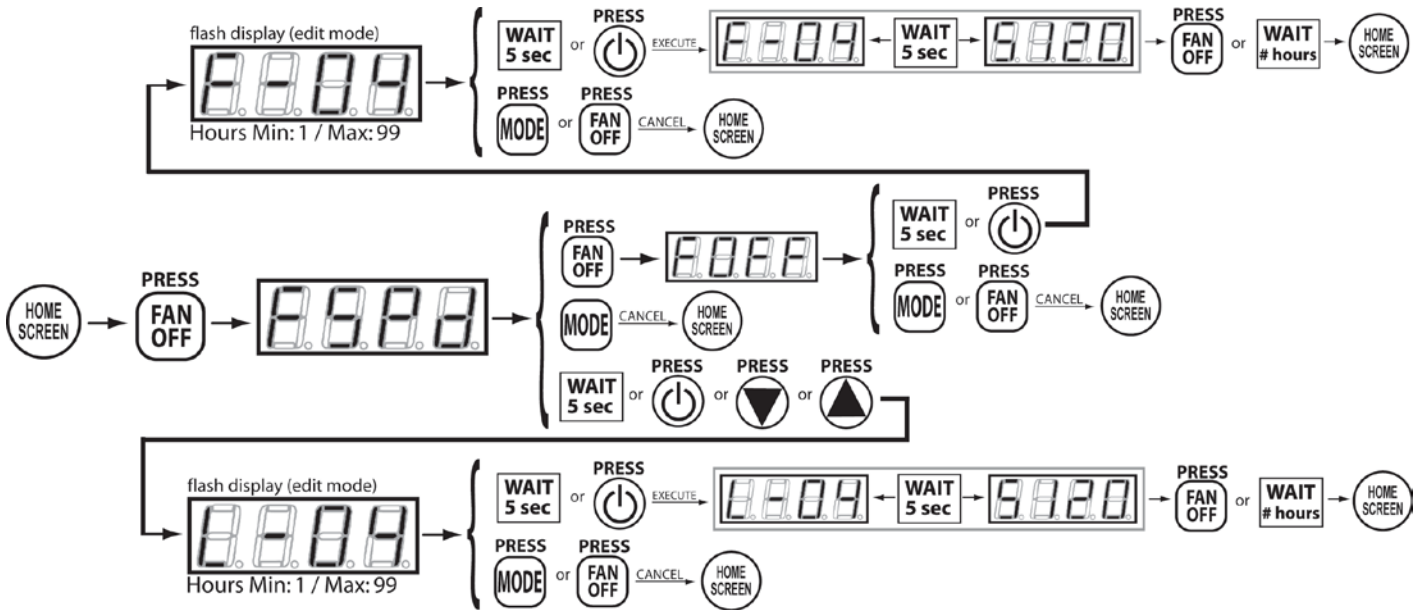


To activate the Fan Off or Fan Speed overrides, from the home screen, press the **FAN OFF** button on the controller. The display will show “FSPd”, this represents the fan speed override. Press the **EXECUTE** button or wait 5 seconds to continue to adjust the Fan Speed override duration or within 5 seconds, press the **FAN OFF** button again, and the unit will display “FOFF” on the screen, this represents the fan off override. Once “FOFF” is selected, either wait 5 seconds or press the **EXECUTE** button to adjust the duration of this override.

To adjust the fan override duration, the display will show “L-04” for low speed override (if the fan speed is currently set to high speed), “h-04” for high speed override (if the fan speed is currently set to low speed), or “F-04” for fan off override, as applicable, with “04” indicating the default time setting for this feature as 4 hours. To adjust the duration, use the ▲ or ▼ buttons on the controller until the display indicates the desired amount of time in hours (e.g., “F-10” for a 10 hour period of Fan Off).


Once the desired time has been set, to begin any fan override features, press the **EXECUTE** button or wait 5 seconds to allow the screen to time. While the fan override feature is engaged, the display will alternate between “S.###,” where “###” is the temperature setting for the unit (e.g. “S.120” for a setting of 120 degrees) and “L-##”, “h-##”, or “F-##,” where “##” is the number of hours remaining in the fan override session.

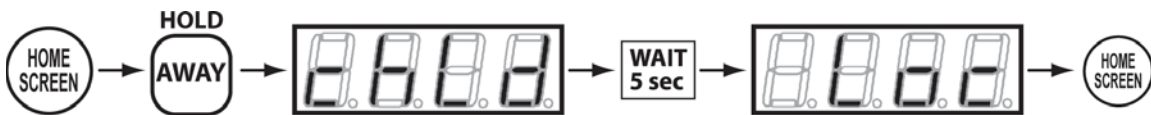
The Fan Off and Fan Speed feature will automatically turn off after the specified number of hours has elapsed. To end the session prematurely, press the **FAN OFF** button once. The display should now alternate between the unit’s temperature setting (e.g., “S.120”) and the mode in use prior to engaging the fan override, (e.g., “hibr” for Hybrid mode).




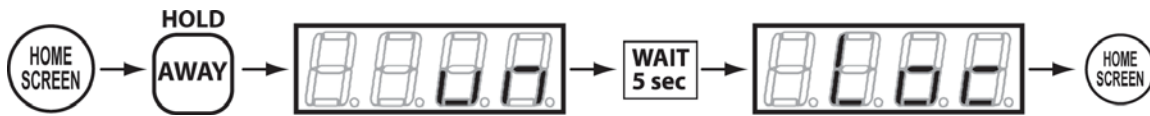
Child Lock

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  button until “chLd” is displayed on the screen. The controller is now locked.











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

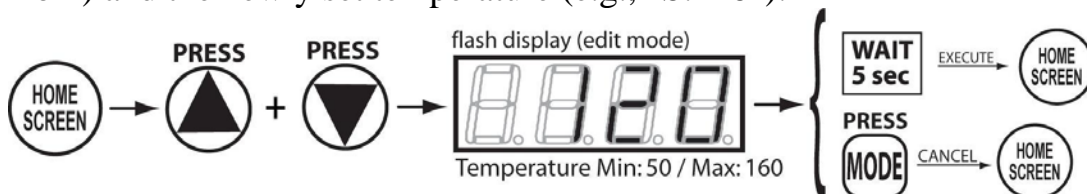


Temperature Setpoint

The temperature setpoint represents the desired approximate temperature of the water inside the heat pump water heater. The setpoint may be adjusted to your liking as high as 160°F degrees or low as 50°F, these are pre-defined temperature limits to prevent boiling and freezing water in the unit and surrounding piping. Standby mode lowers setpoint to 50°F.


To change the temperature set point for hot water output, from the home screen, press the  AND  buttons 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 to save the new setpoint. The setpoint will also be saved about 5 seconds after single button presses (not after fast scrolling). The display will now alternate between the current mode setting (e.g., “hibr”) and the newly set temperature (e.g., “S.116”).



Controller Options and Settings

The Vaughn Heat Pump Water Heater is equipped with various customizable options and settings. A brief overview of each option / setting is listed below:





To access the options menu, from the home screen, press and hold the  button until the display reads “FLtr”, this is the first selection in the options menu.

To navigate the options menu, if “FLtr” is not the desired option, continue to press the  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. The edit mode is active when the display is flashing and the option may be altered by pressing the  or  buttons until the desired choice is displayed. To set the change, let the display timeout after 5 seconds, press the  button, or press the  button. The change will be made and the controller will return the user to the options menu.



Filter





A display alternating between “Err” (error) and “FLtr” indicates that the filter needs to be cleaned. The error will have to be cleared manually, using this menu, after the filter has been cleaned.

To clear the filter warning, in the edit mode press the  or  buttons until “cLr” is displayed (“no” will cancel this operation). To finish clearing the warning, let the display timeout after 5 seconds, press the  button, or press the  button.



Fan Speed

The fan speed option gives the user the ability to adjust the fan speed between two levels, high and low. While it is recommended to keep the fan speed on high for best efficiency, it can be changed to low for noise and air flow reduction purposes.

To change the fan speed, in the edit mode press the  or  buttons to alternate between high speed, “Hi”, or low speed, “Lo”. To set the change, let the display timeout after 5 seconds, press the  button, or press the  button.



Top Differential







Bottom 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 120°F and the differential is 10°F, then after satisfying at 120°F, the water temperature must fall to 110°F before the water heater will call for heat.

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.

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.

To change the top or bottom differential, in the edit mode press the  or  buttons to the desired differential. To set the change, let the display timeout after 5 seconds, press the  button, or press the  button.



Buzzer

The buzzer is programmed to sound every 30 seconds whenever a critical error has been detected. It is designed to attract the attention of the user, and it is highly recommended that the user leave 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 buzzer on, “bOn”, or buzzer off, “bOFF”. To set the change, let the display timeout after 5 seconds, press the MODE button, or press the ⏻ button.



Display

By default, the home screen will show the set point (designated by an ‘S’ preceding the set point). The display option provides the ability to change the temperature on the home screen to show the measured water temperature inside the tank for both the upper and lower sections. If this option is selected, the home screen will cycle the display to show the current mode for 5 seconds, followed by 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.

To change the home display mode, in the edit mode press the ▲ or ▼ buttons to alternate between display setpoint, “diSS”, or display water temperature, “diSt”. To set the change, let the display timeout after 5 seconds, press the MODE button, or press the ⏻ button. When set to “diSt”, if the heat pump or lower heating element is actively heating, the power indicator will blink when “b” is displayed, if the upper heating element is actively heating, the power indicator will blink when “t” is displayed.



Defaults

Enabling this option will reconfigure the controller to factory defaults. The factory defaults are shown below.

Mode: Hybrid
Top Differential: 30
Bottom Differential: 10
Fan Speed: High
Display: Show Set Point
Degrees: Fahrenheit
Buzzer: On

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”. To set the change, let the display timeout after 5 seconds, press the MODE button, or press the ⏻ button



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.

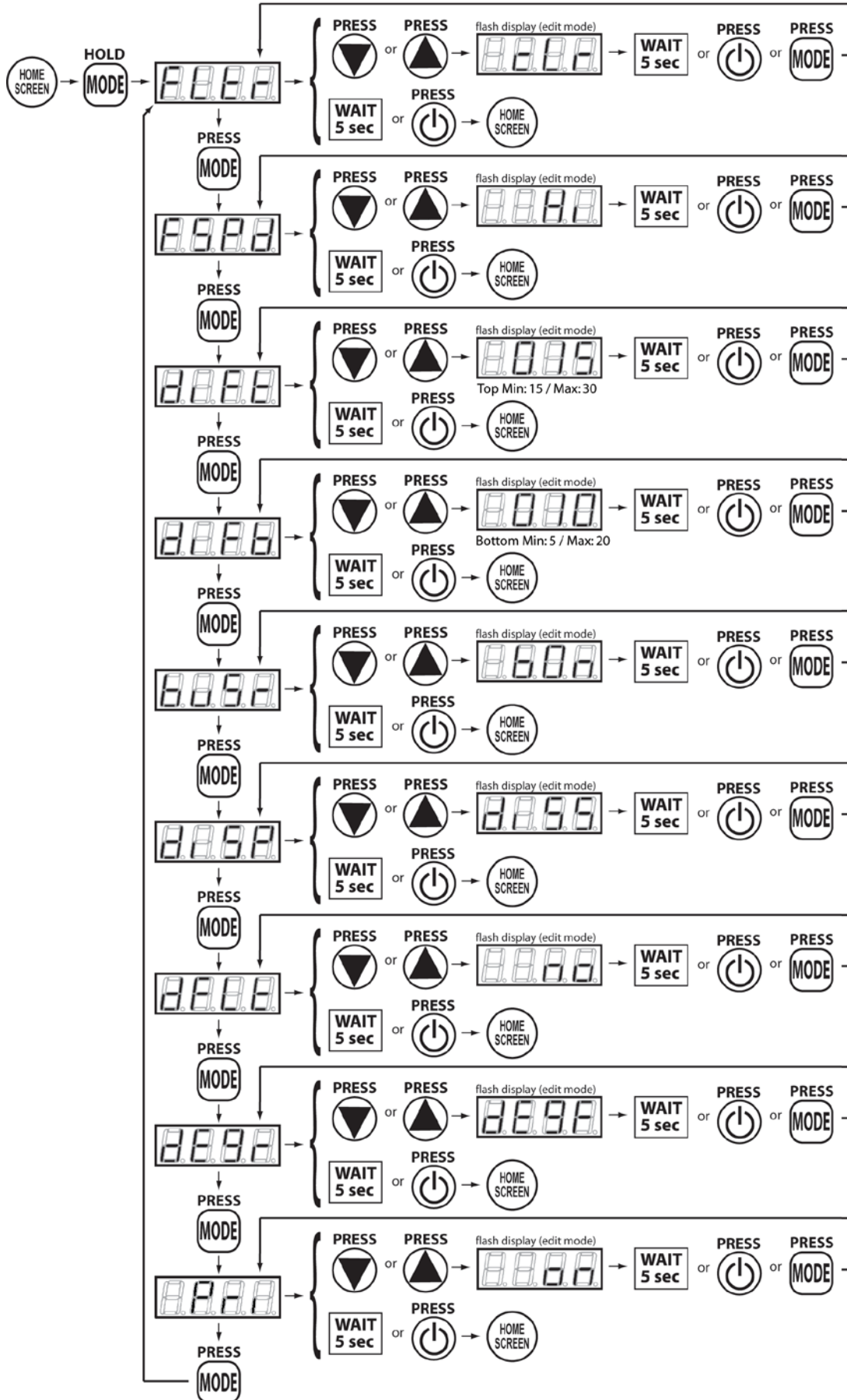
To change the display units, in the edit mode press the ▲ or ▼ buttons to alternate between degrees Fahrenheit, “dEgF”, or degrees Celsius, “dEgC”. To set the change, let the display timeout after 5 seconds, press the MODE button, or press the ⏻ button



Prime

Press the ▲ or ▼ buttons to select ON or OFF. Activating this feature will turn on just the water pump to help it self prime. Pri will show on the display in place of the mode. Use this feature for about 2 minutes if a pressure error occurs after installation or after the tank is drained. Prime is automatically activated for two minutes upon power-up if the power was off to the control for two days or more.

Settings Overview



DATA LOGGER CONFIGURATION AND OPERATION (optional)

About the Data Logger

The Data Logger provides the ability to interface remotely with your Heat Pump Water Heater. Several tasks can be performed using this device, such as performing software updates, and data logging. Primarily this device is used for gathering information regarding the current operation of the Heat Pump Water Heater. It is constantly storing relevant information to memory, such as current temperature conditions inside the tank, user settings, and energy usage. This data can be accessed by the factory to help troubleshoot any problems, or to simply check on the conditions of the unit.

Connecting the Data Logger

The other Data Logger 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 Data Logger can be mounted on top of the tank with the supplied Velcro pieces.

About the LED Indicator

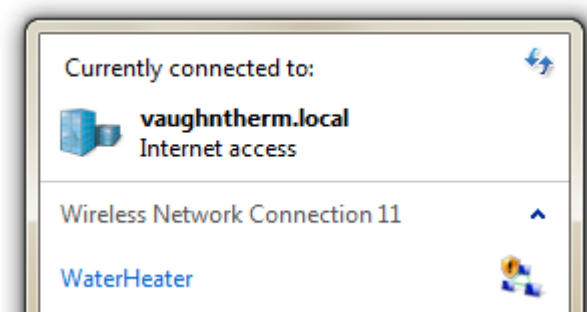
An LED indicator located inside the data logger is used to diagnose the configuration of the device and the status of the connection between the Data Logger and the factory servers.

- Red LED on but not blinking: The device is in default configuration, and has established an Ad-Hoc network.
- Red LED blinking once per second: The device is attempting to link to a user's network.
- Green LED on but not blinking: The device has successfully linked to a user's network.
- Green LED blinking once per second: The device is communicating with the factory servers.

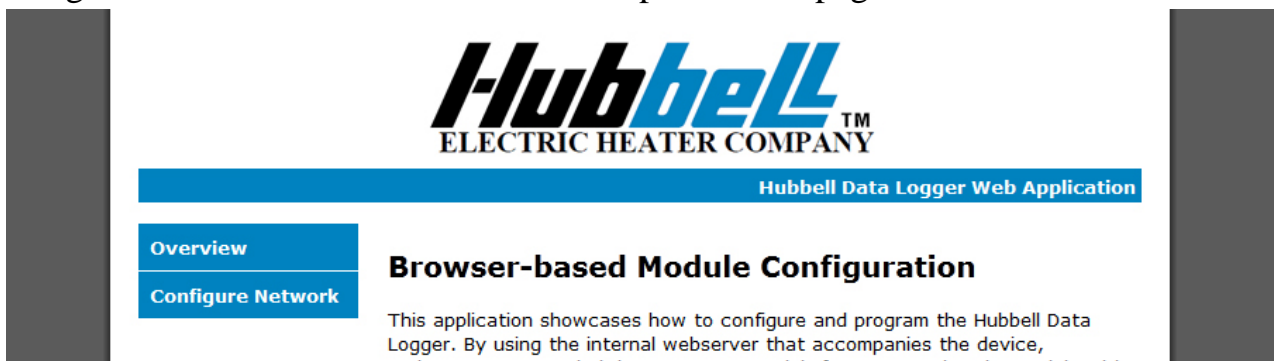
Configuring the Data Logger

When the Data Logger is first powered, it needs to be configured to link into the user's wireless network. This will allow the Data Logger to establish a connection with the factory servers, unlocking the full capability of the device. The following steps describe the connection procedure:

1. Ensure that the Data Logger is powered, and that the LED indicator is flashing red two times per second. This means that the device is setup in its default configuration, and has established its own Ad-Hoc network called "WaterHeater".
 - If the LED is flashing red only once per second, wait one minute. The LED should go blank for a few seconds, and then begin flashing again. The device may repeat this step, but will eventually return to default configuration, flashing red twice per second.
 - If the LED is solid flashing orange or green, the device is already configured, and this setup process may be skipped.
2. With a PC, Laptop, or WiFi enabled device, scan for nearby wireless networks.
3. Connect to the non-secured network called "WaterHeater".



- Once connected, open an internet browser (Safari, Internet Explorer, Firefox, etc) and navigate to “169.254.1.1”. The device setup overview page will be shown.



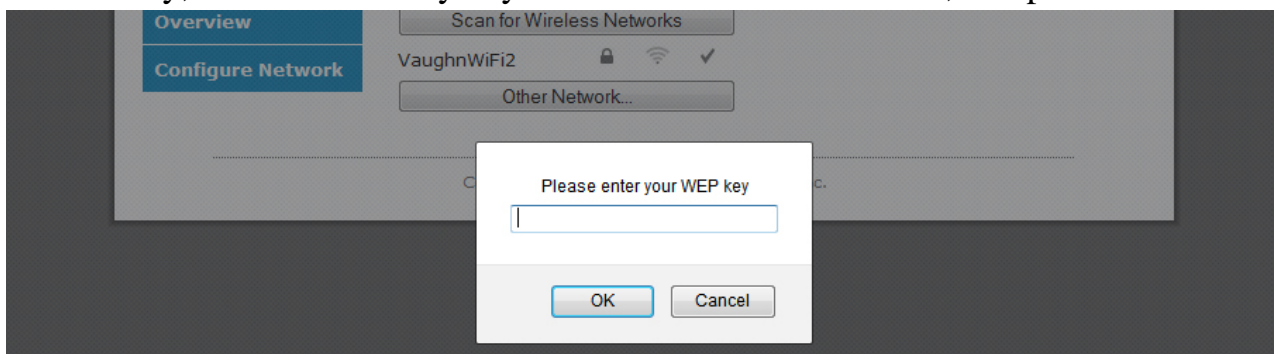
- Click on “Configure Network”. The device configuration page will be shown.



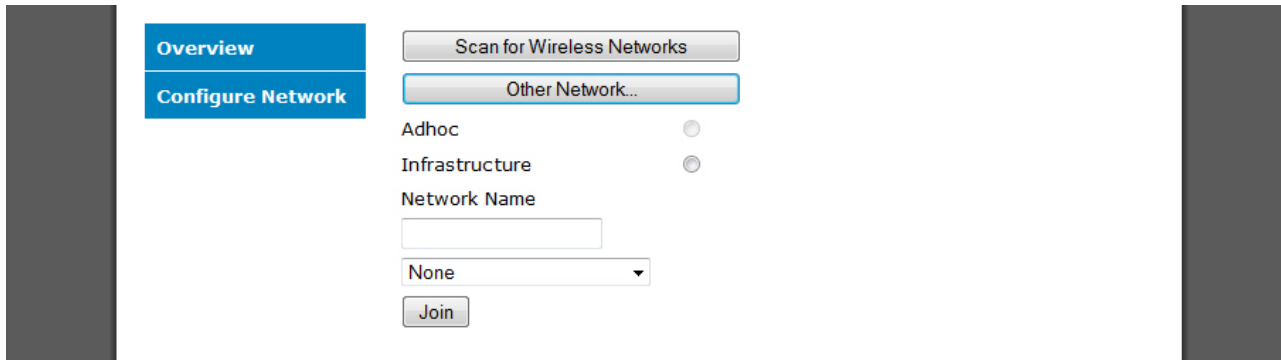
- For networks with a broadcasted SSID, continue to step 7. For networks with a hidden SSID, or if the user wishes to enter the network information manually, skip to step 11.
- Click on “Scan for Wireless Networks”, and wait a few seconds. The webpage should now display information (SSID, signal strength, security-enabled) pertaining to the available wireless networks in the vicinity of the Heat Pump Water Heater.



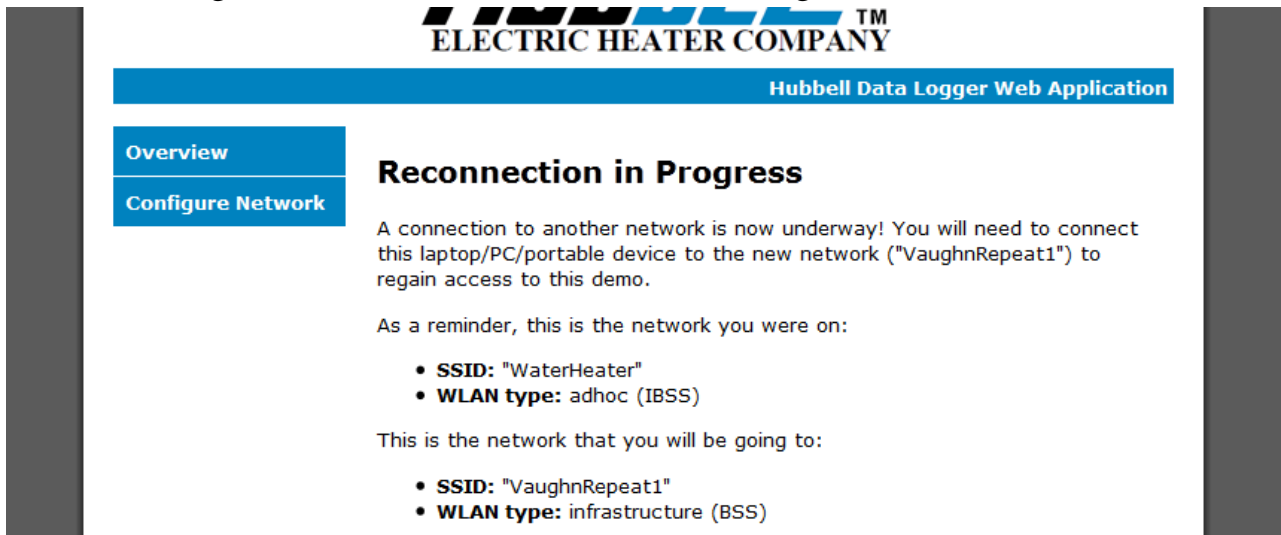
- If the scan does not return any results, either the Wireless AP (i.e. router) is too far away from the device, or is incompatible with the Data Logger.
- Select which network you would like to connect the device to by clicking on it.
 - If necessary, enter the security key associated with the network, and press “OK”.



- Skip to step 13.
- Click on “Other Network”.



12. Enter the information (SSID, security type, and security key) as required into the form and press the “Join” button.
13. The following screen should be displayed, showing information regarding the previous network configuration, and the current network configuration.



14. The Data Logger is now configured. Ensure that the configuration is correct by checking the LED on the device. If it is flashing orange or green, then the device is properly configured and connected to your network. If it is blinking red, the network parameters entered may be incorrect, and if so, please return to step 1 to repeat this process.

If problems are encountered during the WiFi connection process, the following list of tips for setting up routers for 802.11b use describes the settings for most typical access point (AP) configurable parameters to enable compatibility with Microchip MRF24WB0Mx devices:

1. **DHCP Settings** - For DHCP on LAN side (where AP is DHCP server), set Router to Enable DHCP server. Set Client Lease time to be longer than the typical off time of the station to ensure that the IP address provided doesn't change each time the station is powered up. If an option for Always Broadcast is present for DHCP setup (broadcasts all DHCP responses to all clients), it should be disabled.
2. **Data Rate Settings** - Ensure that service rates include 802.11b. 802.11g or 802.11n only rates (green field) should be avoided, but mixed settings are usually acceptable. If a Basic Rate setting is defined, it should be set to 1 and 2MBPS only.
3. **SSID Broadcast** - Should typically be enabled so that the AP sends beacon frames containing the SSID. If disabled, ensure that Microchip Stack is set for Active Scanning.
4. **Channel Selection** - For debug purposes, it is typical to use a fixed channel instead of Auto Channel Selection. If a fixed channel has been selected for the MRF24 Station, select the corresponding channel (channels 1, 6, or 11) for the AP.
5. **Multicast Passthrough** - If using multicast features (ZeroConfig for instance) ensure that the Router is configured to enable forwarding of Multicast packets.
6. **Beacon Interval** - Set the value for the time interval between AP beacons, typical is 100msec. For lower power, this can be set to a smaller value, say 30mS, if the DTIM interval is correspondingly increased.

7. **RTS Threshold** - Set the value for the frame size above which RTS/CTS will be used, typical is 2347.
8. **Fragmentation Threshold** - Set the value for the frame size above which packets will be fragmented, typical is 2346.
9. **DTIM Interval** - Set the value for Delivery Traffic Indication Message Interval, typical is 3 if the Beacon Interval is set for 100mSec. For lower power with the MRF24WB0M, if the Beacon Interval is set to 30mS, then the DTIM should be set to 100 to allow 300mS DTIM Interval.
10. **WLAN Partition (or AP Isolation)**- Prevents AP clients from communicating to each other, typically disabled.
11. **WMM Enable** - Allows wireless multimedia traffic, disable unless necessary for other AP services.
12. **Short Guard Interval (GI)** - Lowers the guard interval between frames, disable unless necessary for other AP services.
13. **WiFi Protected Setup (WPS)** - Enables WPS device discovery, disable unless necessary for other AP services.
14. **Frame Burst** - Enables higher wireless packet throughput, disable unless necessary for other AP services. This may be called turbo, or other marketing terms.
15. **CTS Protection Mode** – Improves reliability of 802.11g traffic, disable unless necessary for other AP services.
16. **Key Entry** – Security can be entered with either a numerical key or an ASCII passphrase. Ensure you enter what the AP expects. If just starting, it is best to have another station like a laptop to validate what the AP is expecting.

SCHEDULED MAINTENANCE



WARNING / CAUTION




Before performing any maintenance procedure, make certain the power supply is OFF and cannot accidentally be turned on.

Freezing

The tank should be fully drained in the event the electricity has been turned off and if there is danger of freezing.

Cleaning the Hot Water Heat Pump Filter

When the filter needs to be cleaned, the controller will alternate between “Err” and “FLtr”. To remove and clean the filter, pull the filter down and out of the filter slot. The filters are set in slots on the side of the white housing, and are designed to be removed from below. Clean the filters either by vacuuming or with soap and water. Allow filters to dry thoroughly before replacing them inside the white housing jacket.

To clear the filter error, press and hold the  button to access the options menu. “FLtr” will be displayed. Use the up or down arrows to scroll to “cLr,” and then let the display timeout, press the  button, or press the  button. The Filter error will be cleared. The error may also be cleared by turning off power to the unit momentarily, and then turning the unit back on.

Annual Inspection

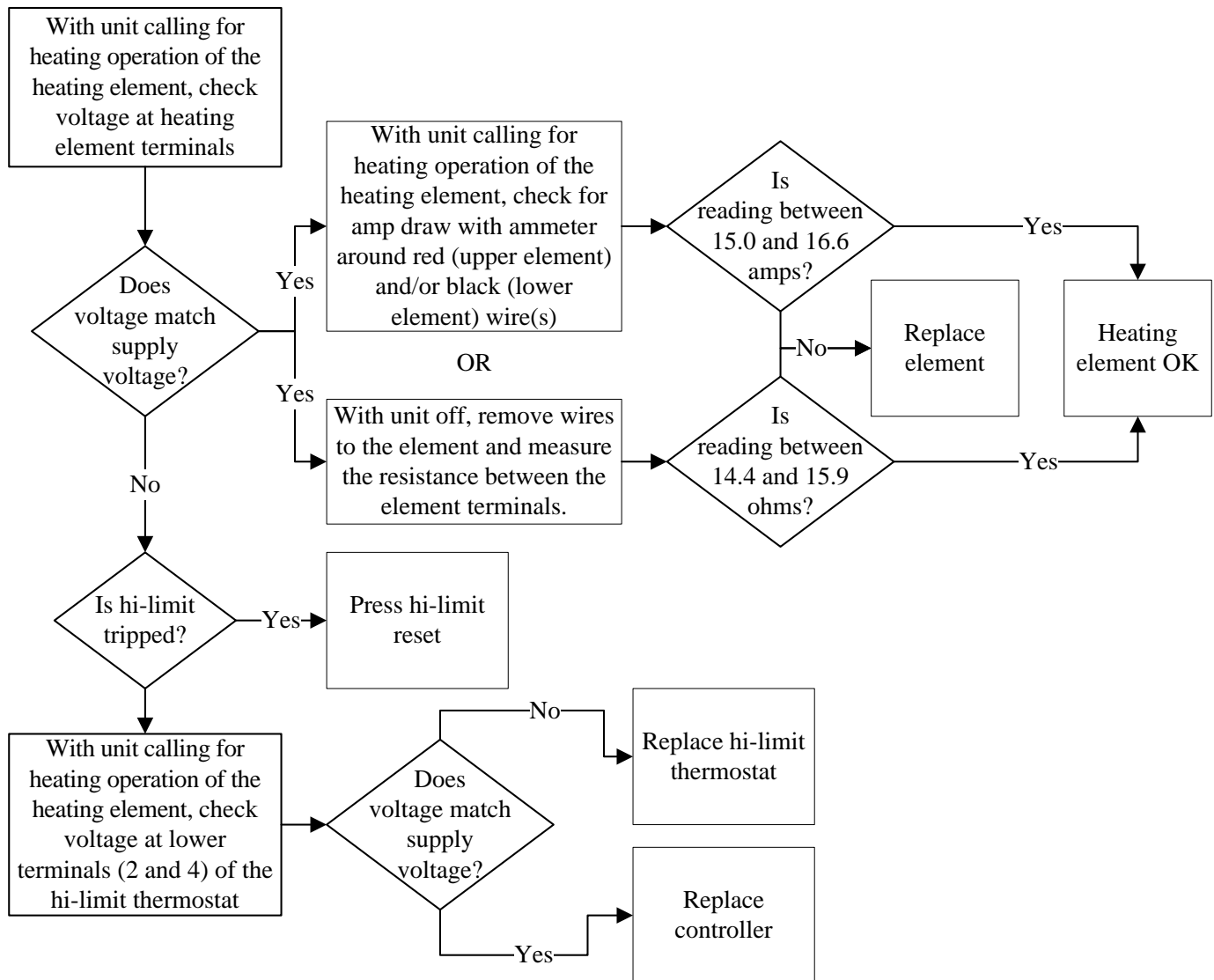
1. Monitor temperature as follows:
 - a. Let water heater completely heat to the designated setpoint.
 - b. When heated (that is, when the decimal before the temperature display on the controller is not blinking), draw water from heater.
 - c. Compare water temperature of drawn water to the temperature setpoint of the controller. Normal variation between the two points is approximately $\pm 5^{\circ}\text{F}$.
 - d. If the two readings do not coincide within acceptable tolerances and verification has been made of the accuracy of the temperature-reading gauge, replace the controller.
2. Lift test lever on relief valve and let water run through valve for a period of approximately 10 seconds. This will help flush away any sediment that might build up in water passageways.
3. Inspect element flanges for leakage as follows:
 - a. Shut off power supply and remove element housing cover.
 - b. Visually inspect heating element gasket for evidence of leakage.
 - c. Rub finger around gasket that is between the heating element and tank flange for any evidence of moisture. If moisture is present or a water drip is observed, replace the heating element gasket.
4. Check for loose electrical connections. Tighten as necessary.
5. Flush tank as follows
 - a. Shut off power supply.
 - b. Close valve on hot water outlet piping.
 - c. Open valve on drain piping.
 - d. Cold water inlet line pressure will be strong enough to flush sediment from the bottom of the tank out through the drain. Let water run for 3-4 minutes.
 - e. Close drain valve.
 - f. Open hot water valve.
 - g. Turn power supply ON.

TROUBLESHOOTING

Symptom	Probable Cause	Corrective Action / Remedy
No hot water	Circuit breaker tripped at source	Reset circuit breaker.
	High limit switch tripped	Reset high limit switch.
	Loose wires	Tighten wire connections.
	Heating element(s) inoperable (only applicable when not in “Econ” mode)	Check heating element operation as indicated below.
	Low line voltage	Have source electrical system checked by an electrician.
	Faulty controller	If controller display is not lit and power is available at the controller, check wire connections then replace controller.
	Faulty temperature sensor(s) / controller	If the temperature indicated by the controller when set to display the actual temperature does not match the actual temperature of the water (within $\pm 5^{\circ}\text{F}$), replace controller and/or temperature sensors.
	Heat pump error	See heat pump error codes below.
Incorrect setpoint (too low)	Increase the setpoint.	
Water temperature below settings at all times	Faulty temperature sensor(s) / controller	If the temperature indicated by the controller when set to display the actual temperature does not match the actual temperature of the water (within $\pm 5^{\circ}\text{F}$), replace controller and/or temperature sensors.
	Heating element(s) inoperable (only applicable when not in “Econ” mode)	Check heating element operation as indicated below.
	Low line voltage	Have source electrical system checked by an electrician.
	Incorrect setpoint (too low)	Increase the setpoint.
	Heater improperly sized	Verify heater is properly sized for the flow rate and temperature rise of your system. Replace elements with proper size as necessary.
Relief valve discharges continuously	Excessive temperature or pressure in tank	Temperature and pressure relief valves are designed to operate if the water temperature exceeds 210°F or tank pressure exceeds the pressure rating of the safety relief valve. If trouble is excessive temperature, then controller is not shutting off at the setpoint and controller must be replaced. If pressure, likely cause is thermal expansion. Contact plumber and consider installing a thermal expansion tank.

Check Heating Element Operation

The following flowchart assumes that supply voltage is present to the unit and all connections are tight.



Heat Pump Water Heater Maintenance Alerts and Procedures

The Heat Pump Water Heater unit will use error messages to notify users that maintenance actions need to be undertaken. These messages will take the place of the home screen display (which alternates between the mode and the current temperature setting).

A display alternating between “Err” (error) and “FLtr” indicates that the filter needs to be cleaned. The error will have to be cleared manually after the filter has been cleaned. This is the only error message that needs to be cleared manually; all other error messages should automatically be cleared upon resolution of the error. See Scheduled Maintenance for how to clean the filter.

A display alternating between “Err” (error) and “drAn” indicates that the flow of the drain tube is being inhibited. Turn off the power to the unit. Remove the condensate tube and inspect for blockage. Blow gently through it to clear any obstruction, if necessary. Restore power to the unit. The error should clear automatically.

A display alternating between “Err” (error) and “PrES” indicates that the water heater has experienced a pressure error. Turn off the power to the unit. Remove the top white casing, and press the red button on the heat pump. This will reset the pressure sensor connection. Activate the PRI setting in the options menu for 2 minutes to help prime the water pump. If the problem persists, contact a service professional.

A display alternating between “Err” (error) and “Ph2o” indicates that the pump’s water temperature sensor has experienced an error. Turn off the power to the unit, and contact your local service professional.

A display alternating between “Err” (error) and “tdEF” indicates that the defroster temperature sensor has experienced an error. Turn off the power to the unit, and contact your local service professional.

A display alternating between “Err” (error) and “Ch2o” indicates that the controller’s water temperature sensor has experienced an error. Turn off the power to the unit. Examine the connections on the back of the controller to verify that connections are complete, and then repower the unit. If the problem persists, contact your local service professional.

A display alternating between “Err” (error) and “conn” indicates that a communications error has occurred between the controller on the upper heat pump unit and the controller on the water heater. Turn off the power to the unit, and examine the connections on the back of both controllers. Power the unit. If the error continues, contact a service professional.

A display alternating between “Err” (error) and “CHS” indicates that a checksum error has occurred. This error may be resolved by turning off power to the unit, and then turning the device back on. If the device does not return to normal operation once the power has been restored, turn off the power again and contact a service professional.

The home screen displays “dEFr” when the unit is in defrost mode. Defrost mode may occur as a result of the fan failing to operate or very low air temperature. When the defrost cycle is complete the unit will return to its normal mode of operation.

SERVICING & REPLACEMENT OF PARTS



WARNING / CAUTION

Before servicing or replacing any part make sure to turn the power supply switch to the OFF position.

NOTE: Reference wiring diagram at the end of the manual.

Surface Temperature Hi-Limit Cutout Switch

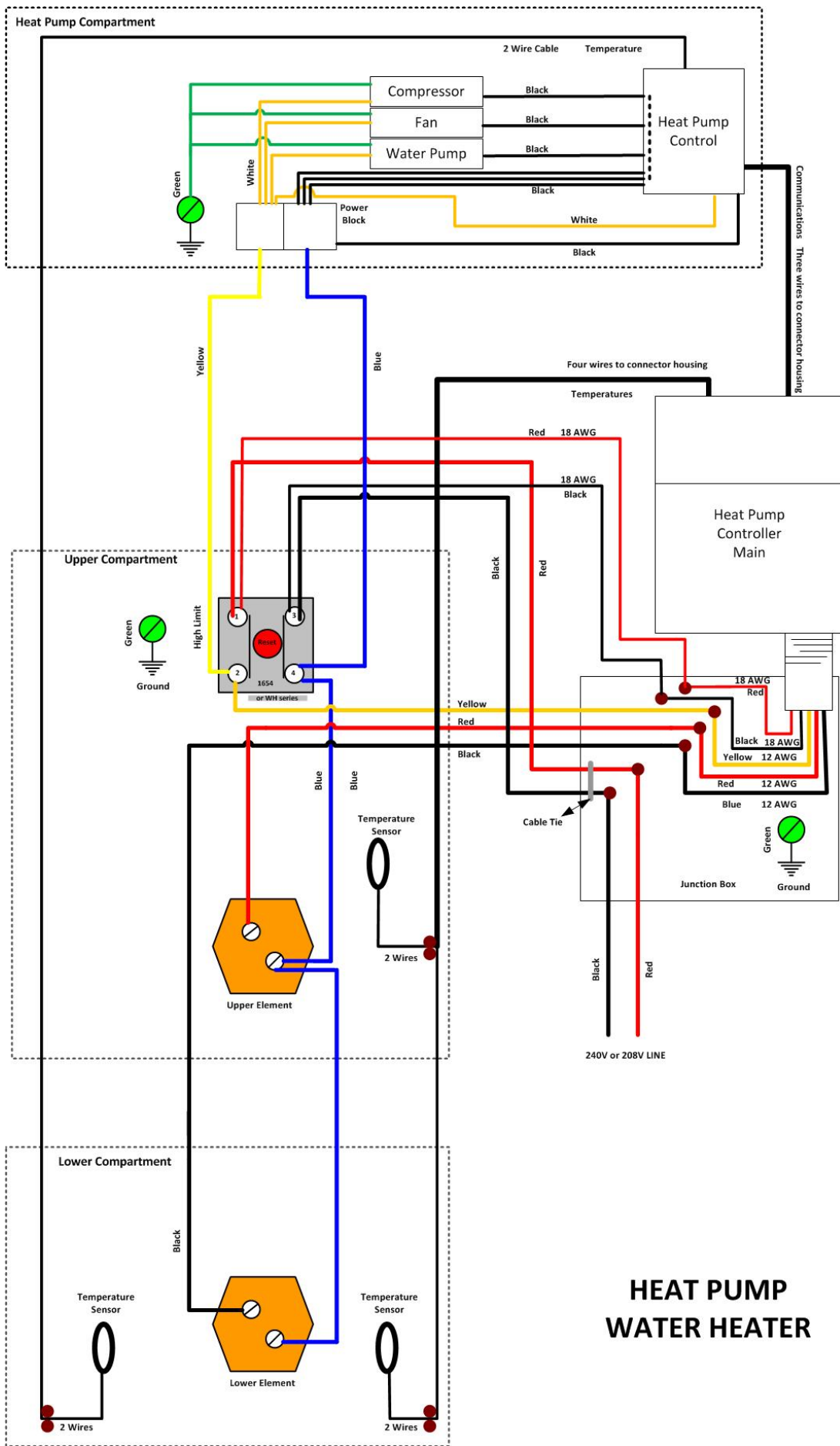
1. Disconnect power from unit.
2. Remove upper access cover.
3. Disconnect the wires from the four terminals.
4. Remove hi-limit switch.
5. Install new high limit switch.
6. Rewire hi-limit switch according to wiring diagram.
7. Reinstall access cover.

Heating Element

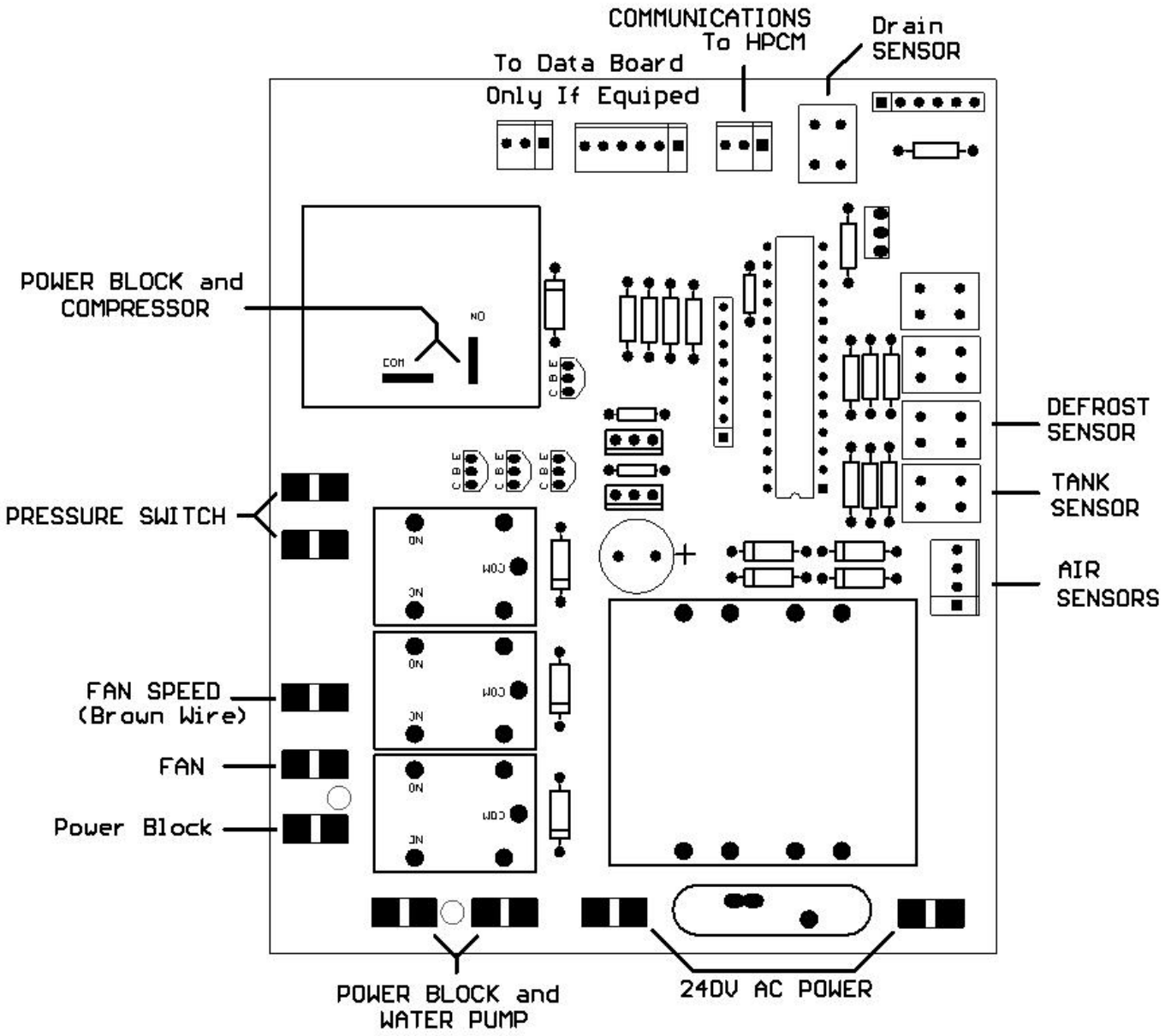
1. Disconnect power from unit.
2. Shut off incoming water supply.
3. Attach hose to drain connection.
4. Lift manual release lever on relief valve to let air into system or break union on outgoing water line and drain water from tank.
5. Remove upper and/or lower access cover, as applicable.
6. Disconnect the wires from the heating element terminals.
7. Remove the element from the tank.
8. Install new gasket and new heating element.
9. Rewire element according to wiring diagram.
10. Fill tank and check around gasket for any leaks. Tighten nuts as required.
11. Reinstall access cover(s).

Relief Valve

1. Disconnect power from unit.
2. Shut off incoming water supply.
3. Lift test lever on relief valve to relieve pressure in tank.
4. Disconnect overflow piping.
5. Unscrew relief valve, remove assembly and replace with new one.
6. Connect overflow piping.
7. Turn on incoming water supply and check for leaks.



HEAT PUMP CONTROL CONNECTIONS



Ten Year Limited Tank Replacement Policy One Year Limited Parts Warranty

Hubbell Electric Heater Company, (hereinafter called the company) offers the following Limited Warranty and Tank Replacement Policy to the purchaser/owner of this stone-lined residential water heater.

This Limited Warranty and Tank Replacement Policy is not transferable beyond the original purchaser/owner and is not valid if 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.

LIMITED WARRANTY

DURATION: The warranty is effective for (1) year beginning with 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 electric 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 at 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: (10) years from the date of original purchase. 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: 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 of 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 at 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 return of the defective unit at the expense of the purchaser.

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 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. The unit must be operated within the factory calibrated temperature limits and water pressure not exceeding 150 psi.
3. Any failure or malfunction that results from improper or negligent operation, accident, abuse (including freezing), misuse, unauthorized alteration or improper maintenance is specifically excluded.
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 exclude any implied warranty of merchantability or of fitness for any particular purpose, as well as any performance warranty.

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.

NOTES

NOTES



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