

EcoSmart™ Troubleshooting Guide

Models ECO 8 – 13 kW



ECO
SMART™
TANKLESS WATER HEATERS

This guide is designed for installers or homeowners to help troubleshoot any issues experienced during the lifetime of the tankless water heater.

For additional help, go to ecosmartus.com/support/videos and view the troubleshooting videos, or email technical support at support@ecosmartus.com.

ECO SMARTUS.COM



This page will help you navigate our troubleshooting guide. Read each step carefully and do not skip ahead. For additional help, contact technical support by email at support@ecosmartus.com, or call 877-474-6473, Monday-Friday, 9:00 am—5:00 pm EST.

Existing installations

- LED display light is not activating with flow rate
 - **Follow Activity B (page 6)**
- LED display light is illuminated on heater, but unit is not heating
 - **Follow Activity A (page 4)**
- Not receiving power at unit
 - **Follow Activity C (page 9)**
- Unit is no longer producing adequate heat, but is activating
 - **Follow Activity D (page 10), and then Activity E (page 12)**

New installations (same day install)

- LED display light is not activating with flow rate, but does when rotating round knob
 - **Follow Activity B (page 6)**
- LED display light is illuminated on heater, but unit is not heating
 - **Follow Activity F (page 15)**
- Unit is not activating, even when rotating round knob
 - **Follow Activity C (page 9)**

When contacting technical support, please have your model and serial number ready. The serial number is located on the front cover of the unit. Serial number is printed on a white and black pixelated sticker and begins with the letters S/N followed by numbers (*see image below*).



This guide is for use by qualified electrical professional and/or homeowners.

This guide takes you through a sequence of steps that **MUST** be followed. Skipping steps will prevent you from being able to successfully detect and resolve a problem.

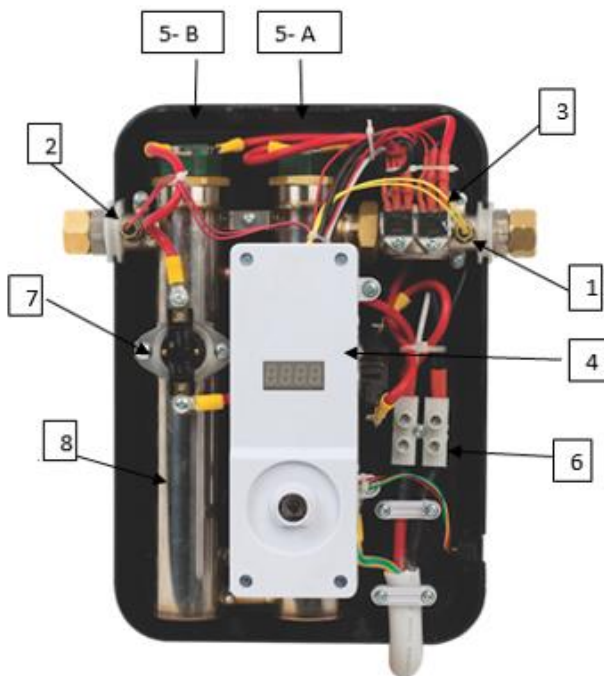
All electric tankless units are designed to be checked with a multi-clamp volt meter (*pictured right*) to measure for both voltage and amperage.

Below is an inside view of an electric tankless water heater.

Always write down any volt meter readings/results before contacting technical support.

8 kW = 1 Heating Element (1 chamber heat exchanger)

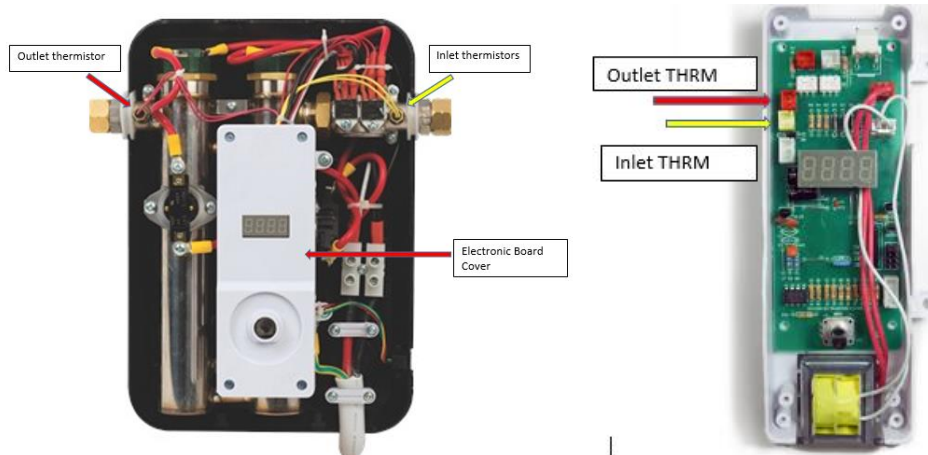
11-13 kW = 2 Heating Elements (2 chamber heat exchanger)



Parts Diagram	
1	Inlet thermistor
2	Out thermistor
3	Flow Meter
4	Control board
5 - A	Heating Eleemnt
5 - B	Heating Element
6	Terminal block
7	Thermostat
8	HEATEXCHANGER

For additional help, contact technical support at 877-474-6473, Monday-Friday, 9:00 am—5:00 pm EST, by email support@ecosmartus.com, or on our website ecosmartus.com.

Activity A | Thermistors Troubleshooting



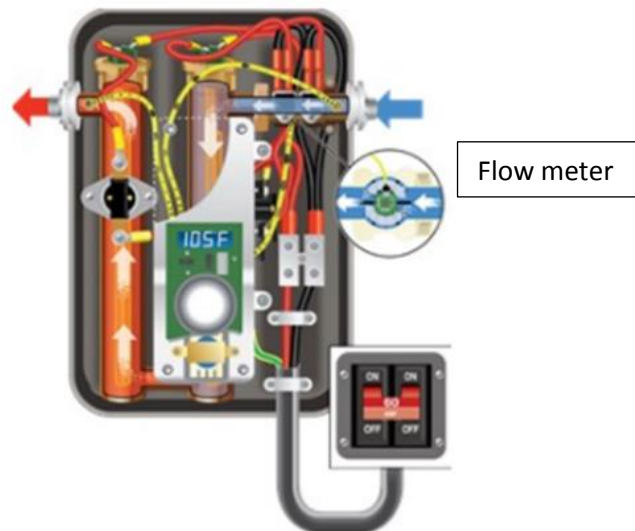
Each heater is equipped with two thermistors (*see image above*). One located on the inlet side (yellow wire) and one located on the outlet side (red wire). The function of the thermistors is to measure the incoming and outgoing water temperature and keep it within 1 to 2 degrees (+ or -) of the set temp shown on the LED display. If the thermistors fail, the heater will still activate, however the control board will not send power to the elements. Follow these steps to test the thermistors.

1. Turn OFF breaker
 - a. Once breaker is off, turn round knob to ensure no power is at the unit.
LED display will not light up if the correct breaker is off.
 - b. If LED display does illuminate, the correct breaker was not turned off.
2. Unscrew front cover of unit. You will notice a **“Warranty Void if Seal Broken”** sticker, disregard this.
 - a. Warranty will not be voided. This sticker is there for safety purposes to ensure customers *contact technical support before opening the unit.*
3. Locate white plastic cover covering control board and remove.
 - a. Cover is secured with Philips head screws, one in each corner.
4. Locate thermistor on control board (*see image above*).
 - a. Disconnect inlet and outlet thermistors from control board.
 - i. Both wires are quick-connect style. To disconnect, gently pull on wires until unplugged.
 - ii. Inlet is yellow
 - iii. Outlet is red
5. Turn breaker ON
 - a. Leaving thermistors unplugged, turn breaker back to ON position.
6. Run water
 - a. Turn on the hot water tap for approximately 45/60 seconds. During this time, the unit should begin to heat water.
 - b. Make sure LED display is illuminated on heater.
 - i. If it is not, check that the correct breaker was turned on.

7. Issue resolved

- a. If the heater begins to heat with thermistors disconnected, then these parts need to be replaced. If the heater is still within warranty, parts will be covered. If not, parts can be purchased online at Amazon.com or through our support team.
 - i. https://www.amazon.com/EcoSmart-THRM-Ecosmart-Thermistor/dp/B00Z0Z5IP2/ref=sr_1_1?s=industrial&ie=UTF8&qid=1518718177&sr=1-1&keywords=Ecosmart+thermistor
 - ii. Support info email at support@ecosmartus.com or by phone at 877-474-6473
- b. Issues not resolved
 - i. Please go to Activity C | Electrical Connection

Activity B | Flow Meter Troubleshooting

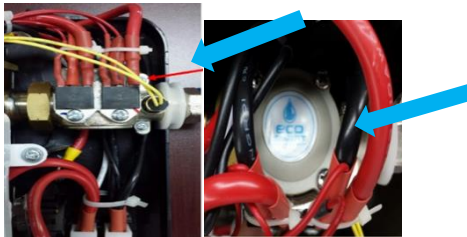


The flow meter is located on the inlet side of the water heater and has 4 Phillips head screws and a small black wire (see image above). The flow meter is equipped with a small propeller that must spin freely counter clockwise in order to activate heater. The flow meter controls the activation of the water heater by sensing water flow. If the flow meter is functioning properly, the LED display will illuminate once water is flowing through the system and will continue to stay illuminated while water is running. If the LED display not illuminated while water is running, follow the steps below.

If this is not a new installation (same-day install) skip Step 1.

1. Check to make sure your water lines are not crossed. Your cold water inlet is located on the right side of the heater. Water *must* flow right to left in order to activate heater. To verify water lines are connected correctly follow these steps.
 - a. Turn OFF breakers
 - b. Turn OFF incoming water line (per national plumbing codes, there must be a shut-off valve within 5 to 10 feet from the water heater)
 - c. Unscrew outlet water line and place bucket under outlet water line on heater
 - d. Slowly turn water valve back on and check to see if water is flowing out of the heater, or out of the disconnected water line.
 - i. If you find the water is flowing out of the disconnected water line, your water lines are crossed and must be swapped.
 - ii. If water is flowing out of the heater, water lines are properly connected. Reconnect water pipes and move on to Step 2.
2. To clean out flow meter, run a high volume of water through your system to flush out any particles that may be preventing the flow meter from spinning freely.
 - a. Run at least 5 to 6 GPM for 3 minutes. This could be a bath tub, shower, and a sink, or two showers and a sink running simultaneously.
 - b. Once you have a high volume of water flowing through your heater, check that LED display is illuminated. This can take up to 3 minutes.
 - i. You may hear a loud humming noise coming from the heater; this is normal.

- c. If the LED display is illuminated with water flowing, you can begin to slow down the GPMs. Close all running water taps except for 1 sink to verify water is heating and LED display is staying on. Leave this sink running for approximately 45-60 seconds, during this time the unit should be heating water.
 - i. If the LED display is not staying illuminated, continue to Step 3.
3. Thoroughly clean the flow meter. This process takes 10 to 15 minutes.
- a. Turn OFF breaker
 - i. Once breaker is off, turn round knob to ensure no power is at the unit.
 - LED display will not light up if the correct breaker is off.**
 - ii. If LED display does illuminate, the correct breaker was not turned off.
 - b. Unscrew front cover of unit. You will notice a **“Warranty Void if Seal Broken”**; disregard this.
 - i. Warranty will not be voided. This sticker is there for safety purposes to ensure customers *contact technical support before opening the unit.*
 - c. Locate flow meter
 - i. Flow meter is a device located on the inlet side of water heater and consists of 4 Phillips head screws and a small black wire (see image below)



- ii. Remove 4 screws and pull cover off, remove propeller and clean. Make sure propeller is spinning freely and that all components are in the correct order (see pictures below).



Top Cap



Inside/PC board

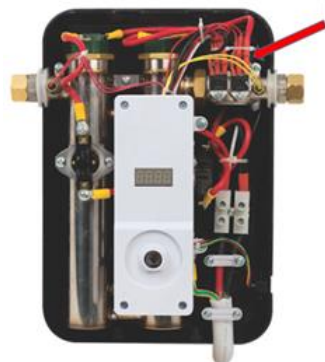


Propeller

- iii. Turn water on and open a few faucets for 3-5 minutes to flush the water lines and make sure there are no air pockets. **Skipping this step might cause permanent damage to the heating elements.**
- iv. Turn on power to the unit and verify LED display remains illuminated with water running. Let water run for approximately 45 to 60 seconds, during this time the unit should be heating water.

4. If this does not resolve the issue, flow meter must be replaced. If the heater is still within warranty, the part will be covered. If not, a flow meter can be purchased online at Amazon.com or through our support team.

- a. https://www.amazon.com/Ecosmart-FSA-NFSML-Flow-Sensor/dp/B00Z0Z6IWE/ref=sr_1_1?ie=UTF8&qid=1518709105&sr=8-1&keywords=ecosmart+fsa+nfsml+flow+sensor
- b. Support info: 877-474-6473, or Support@ecosmartus.com



Flow Meter

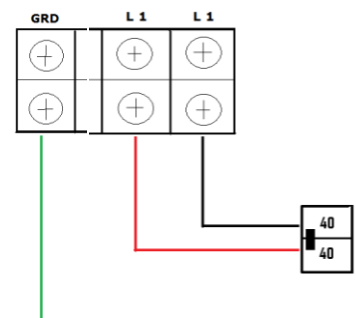
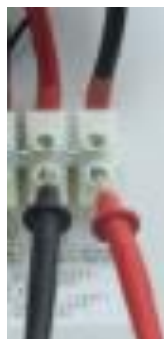
Activity C | Electrical Connection

Models 8-13 kW are supplied with a 2-prong terminal block (*part number 6, on page 3*). Each one of the connection sets must be connected to an independent double pole breaker.

- 8 kW requires 1 double pole 40 amp breaker
- 11-13 kW requires 1 double pole 60 amp breaker

Check that the set of wires from each leg are connected correctly, otherwise the unit will not function as designed. To make sure wiring is connected correctly, perform the following test.

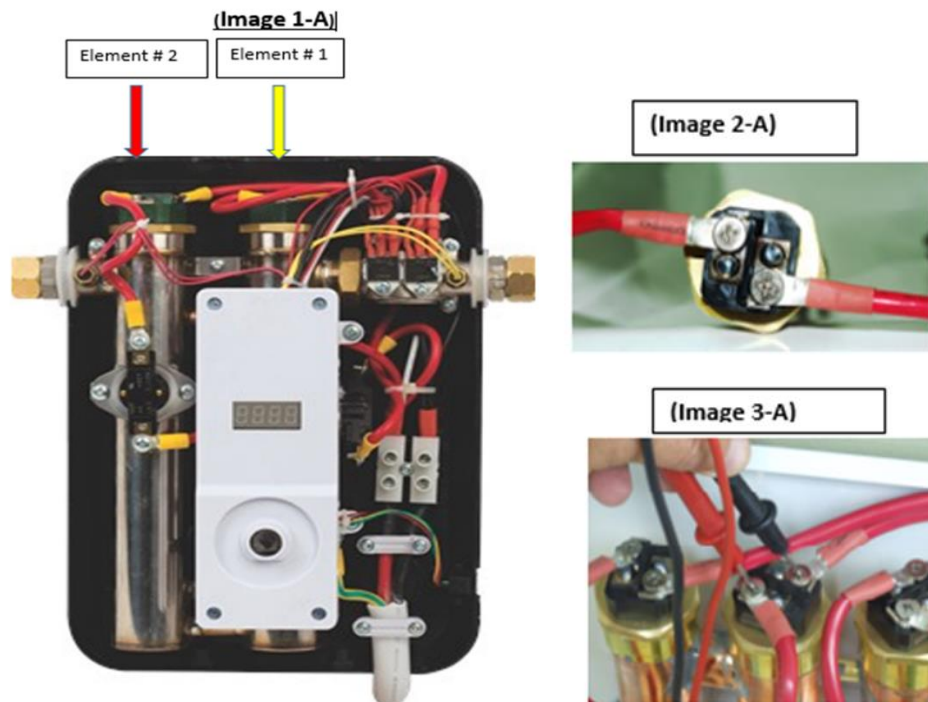
1. Remove front cover
 - a. Locate 2 small Phillips head screws on bottom of unit
 - b. Unscrew front cover of unit. You will notice a **“Warranty Void if Seal Broken”**; disregard this.
 - i. Warranty will not be voided. This sticker is there for safety purposes to ensure customers *contact technical support before opening the unit*.
2. Using a voltmeter
 - a. Place one probe on black wire terminal and the other probe on red wire terminal, when measuring across you should get a reading of 208-240v (depending on the power coming from your service panel).
 - b. If you are getting a 0.00, or low voltage reading. The problem might not be at the unit, but at your electrical panel, or breakers. Please check power at panel or directly at breaker.



Keep in mind the voltage you are receiving at the terminal will depend how many kilowatts (kW) your unit can pull. If you are receiving power lower than 220v, your unit decreases in kW by 25% giving you a lower temperature rise. For example: an 11 kW model receiving power lower than 220 volts will become an 8.25 kW model.

Activity D | Checking Elements

The following steps verify the heating elements are working correctly. The heating elements will only draw voltage when hot water is being called for and uses only the voltage needed based on the temperature setting. This feature is called self-modulation. When hot water is ‘demanded’ the elements instantly draw power. The heating elements then work in series, which means that the element #1 (located on the inlet side of the unit) will be the first to draw power. In order for the second element to draw power, the first element must be drawing at 100% capacity.



1. Locate elements

- A. There are two red wires connected to the top of each element. To check if the element is working, turn on a hot water tap. We suggest running the shower or sink so that both elements will draw voltage and can be checked. Once water is running through the unit, the LED display will light up and show the temperature setting on the unit. Using a volt meter, place one probe on one screw and the other probe on the other screw located on the top of the element (*see image 2-A*). Check what voltage is being drawn.
- B. When measuring voltage across the top of the elements there will be a reading between 220v – 240v. **You must have water running in order for the elements to activate and draw power.**
- C. If LED display is illuminated, water is running through the unit, and a 0 voltage reading is given (when measuring with probes on each screw), perform conductivity test:
 - i. Turn breaker OFF, set meter for ohms and place one probe on one screw and the other probe on the other screw located on the top of the element. (*see image 2-A*)

- ii. If the reading is in the range of 6-10 ohms, the element is good and it will be necessary to contact technical support team for further troubleshooting.
 - iii. If the ohm reading is lower than 5 or higher than 10, the element will need to be replaced. Element failures are commonly due to air pockets, scale/sediment buildup, and/or freeze damage.
- D. If the heater is still within warranty, part will be covered. If not, parts can be purchased online at Amazon.com or through our support team.
 - i. https://www.amazon.com/Ecosmart-HE-55220-Heating-Element/dp/B00Z0Z5KFK/ref=sr_1_2?ie=UTF8&qid=1518728218&sr=8-2&keywords=ecosmart+heating+element
 - ii. Support info: 877-474-6473 or Support@ecosmartus.com

Activity E | Required Maintenance

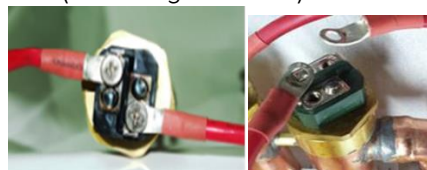
When scale forms on elements, it is due to minerals such as calcium and magnesium found in water. There are three ways to deal with this this issue. Manual Maintenance, Recirculating Maintenance, and Filtration Maintenance.

Please Note: *It is the responsibility of the unit owner to be aware of your water quality and its effect on the heater. Failure to properly maintain your unit may result in damage to the heating elements or heat exchangers if sediment/mineral and/or lime build up. This damage is not covered by the warranty.*

Manual Maintenance

Depending on how hard the incoming water is, maintenance may need to be performed every 6 to 12 months. **What is needed:** 1 five gallon bucket and 3 to 4 gallons of undiluted white vinegar (food grade).

1. Turn OFF breaker
 - a. Once breaker is off, turn round knob to ensure no power is at the unit.
LED display will not light up if the correct breaker is off.
 - b. If LED display does light up, correct breaker was not turned off.
2. Turn off water going into unit
 - a. Per national plumbing codes, there must be a shut-off valve within 5 to 10 feet from the water heater. If there is not a dedicated shutoff valve, shut off the main water line to home.
 - b. Once water is off, verify this by turning a tap ON at a sink. Turn tap on to hot side and let run until water is dripping lightly and leave open to relief pressure.
3. Remove front cover of unit
 - c. To remove front cover, locate the 2 Phillips head screws on the bottom of unit. Remove front cover of unit. You will notice a **“Warranty Void if Seal Broken”**; disregard this.
 - i. Warranty will not be voided. This sticker is there for safety purposes to ensure customers *contact technical support before opening the unit.*
4. Locate heating elements (*see Image 1 - A on page 10*)
 - a. Depending on model, the unit may have either 1 or 2 heating elements.
 - b. Locate heating elements and remove both Philips head screws on top of element and fold red wires back (*see images below*).



5. Remove element
 - a. The element has a brass hexagon manifold located on top. Grip hexagon brass top of heating element and rotate counter clockwise to unscrew from the copper tank, see picture below;



Cleaning Process

- a. Place elements in a small bucket and add white vinegar. Cover element to just under hexagon brass top. **Do not submerge whole element.** Vinegar can also be poured into heating chamber if needed.
 - We recommend letting elements soak for at least 3 hours.

Replacing Elements

- a. Insert and rotate heating element clockwise until tight
- b. Reset red wires and tighten screws
- c. Turn water ON to unit. Inspect for leaks. (If an element is not fully tightened down, it may leak.)
- d. Open a few hot water faucets for 2 to 3 minutes to remove air pockets in the lines

Recirculating Maintenance

What is needed: 1 five gallon bucket, 1 four gallon-per-minute recirculating pump, two ¾ inch female hoses, and 3 to 4 gallons of undiluted white vinegar (food grade). Depending on the hardness of the water in your area, you may need to perform this maintenance once to twice a year. See diagram on page 14.

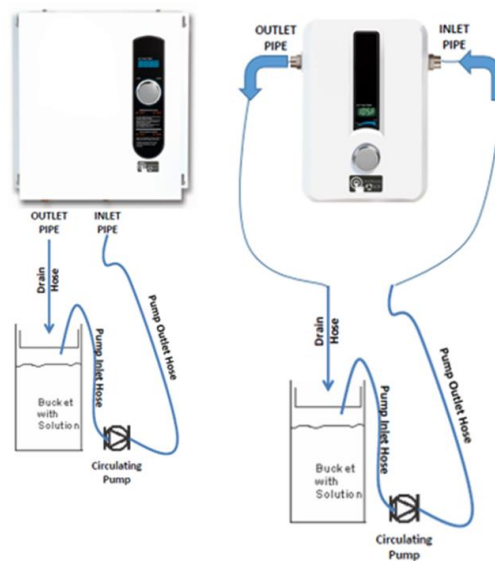
Flushing the Heat Exchanger

1. Disconnect electrical power to the water heater
2. Close shut off valves for both hot and cold water lines
3. Place bucket under service valve of hot water line
4. Unscrew cap from service valve on hot water line
5. Let water from heater drain completely into bucket
6. Unscrew cap from service valve on cold water line
7. Connect pump outlet hose to service valve
8. Connect drain hose to service valve on hot water line
9. Pour 4 gallons of white vinegar into bucket
10. Place drain hose and pump inlet hose into the vinegar

11. Operate the pump and allow vinegar to circulate through the water heater for at least 3 hours at a rate of 4 gallons per minute.

Rinse Vinegar from Water Heater

1. Remove free end of drain hose from bucket and put in a sink or outside to drain
2. Allow vinegar to completely drain from drain hose
3. Disconnect pump outlet hose from service valve on the cold water line. Use bucket to capture any excess water that may be in the line.
4. Screw cap tightly back onto service valve of cold water line*
5. Open shut-off valve on cold water line
6. Allow water to flow through water heater for 5 minutes as it continues to drain
7. Close shut-off valve on cold water line and allow heater to drain completely
8. Remove drain hose from service valve on hot water line
9. Screw cap tightly back onto service valve*
10. Open both cold and hot water line shut off valves
11. Open a few faucets of hot water for 2-3 minutes to remove any air pockets in the lines
12. Restore electrical power to the water heater



Filtration Maintenance

For filtration maintenance we recommend consulting your local water company or a water filter specialist. You can find these filter systems at most hardware and plumbing supply stores, or online. It is important to regulate calcium, lime and sediment levels in your water before it enters your tankless water heater. See recommended levels below.

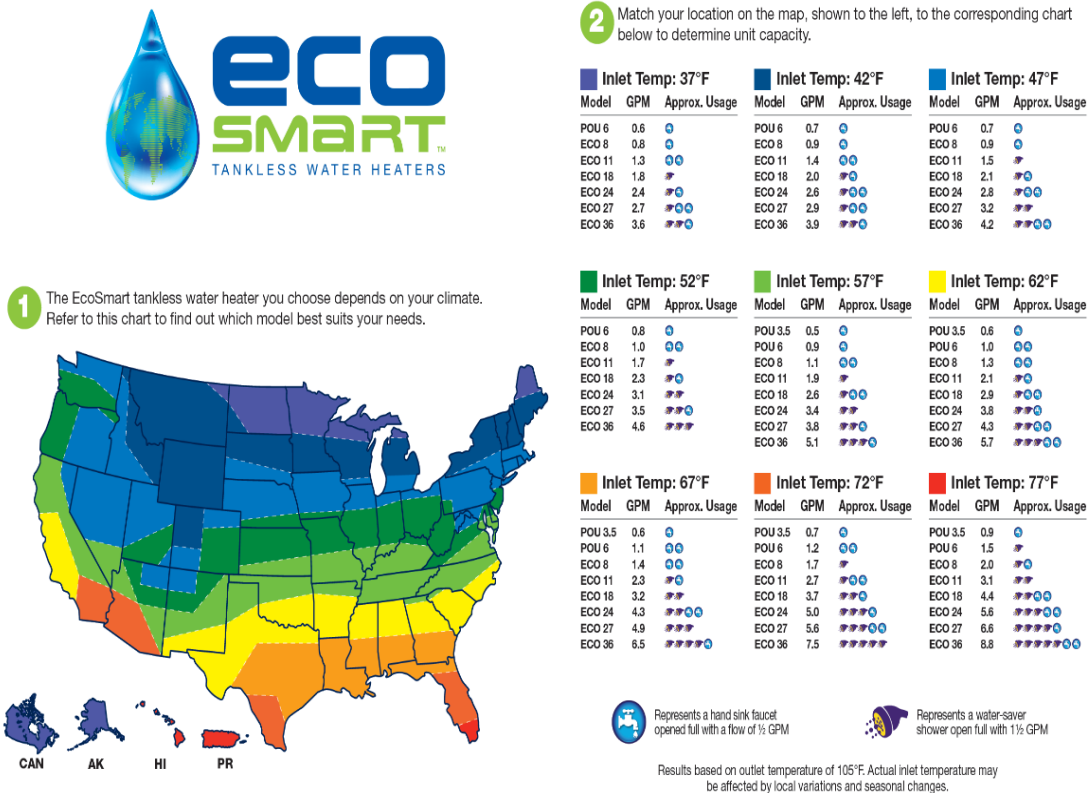
Recommended Water Quality Levels									
pH	Total Dissolved Solids (TDS)	Free Carbon Dioxide (CO@2)	Total Hardness	Aluminum	Chloride	Copper	Iron	Manganese	Zinc
6.5 - 8.5	Up to 500 mg/L	Up to 500 mg/L	Up to 200 mg/L	0.5 to 0.2 mg/L	Up to 250 mg/L	Up to 250 mg/L	Up to 0.3 mg/L	Up to 0.5 mg/L	Up to 5 mg/L

Activity F | Sizing

Meeting temperature rise (ability to heat water to set/desired output temperature) for an electric tankless water heater is dependent on the climate/region where a heater is installed. Colder incoming water requires a larger kilowatt model. The same applies for flow rate. To meet the demand for higher flow rates, a higher kilowatt model is needed. There are 3 pieces of information needed to determine what size electric tankless water heater is right for you.

- **Watts:** Amount of energy needed to heat water to meet set/desired temperature
- **Temperature Rise:** Difference between inlet water temperature and set/desired outlet temperature
- **Flow Rate:** Measured in gallons per minute (GPM)

The chart below will assist in selecting the correct model based on your location.



Certified through the ETL Nationally Recognized Testing Laboratory to UL 499 and CSA.