BRADFORD WHITE®

WATER HEATERS

Residential Electric Water Heaters with ICON E™ Electric Control

SERVICE MANUAL

Troubleshooting Guide
and Instructions for Service

(To be performed ONLY by
qualified service providers)

Models Covered by This Manual:

Residential:
ERE240(S,L)
ERE250(S,L,T)
ERE255T
ERE340(S,T)
ERE350S

A Spanish language version of these instructions is available by contacting the manufacturer listed on the rating plate.

La versión en Español de estas instrucciones está disponible contactando a la fábrica cuyo nombre aparece en la placa de

WARNING
CANCER AND REPRODUCTIVE HARM
WWW.P65WARNINGS.CA.GOV

As required by the state of California Proposition 65.

238-55036-00A REV 11/22

Save this manual for future reference

Table of Contents

Introduction

This service manual is designed to aid service and maintenance professionals on the function, proper diagnosis and repair of Bradford White residential electric water heaters.

The text and illustrations in this manual provide step by step instructions to facilitate proper operation and troubleshooting procedures. Contact the Bradford White Technical Support Group immediately if diagnosis cannot be made using the methods described in this service manual.

Tools

- Multi Meter
- 1-½ Deep Well Socket
- ¼" Nut Driver
- Phillips Head Screw Driver
- Thermometer
- Drain Hose

Various Hand Tools: Pipe Wrench, Channel Locks, Pliers (common & needle nose), Wire cutters, Wire Strippers, Flash Light.

Commonly Used Formulas

Amps = $\frac{\text{Watts}}{\text{Volts}}$ (for single phase units) Example: 4500W/240V = 18.75A

Amps = $\frac{\text{Watts}}{\text{Volts x 1.732}}$ (for balanced 3 phase units) Example: 4500W/(240V x 1.732) = 10.82A

Watts = Amps x Volts Example: 18.75A x 240V = 4500W

Ohms = $\frac{\text{Volts}^2}{\text{Watts}}$ Example: $(240V)^2$ / 4500W = 12.8 Ohms

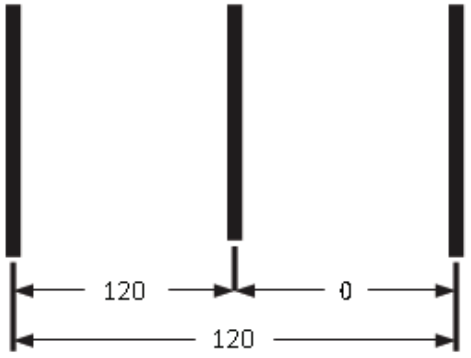
Common Service Wire Configurations

120 VOLT

BLACK Ungrounded

WHITE Grounded (Neutral)

GREEN Grounding

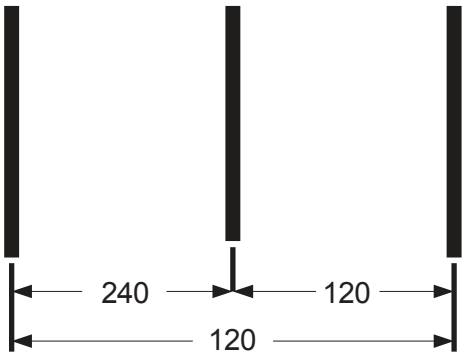


240 VOLT

BLACK Ungrounded

RED Ungrounded

GREEN Grounding



⚠ WARNING

THE WATER HEATER **MUST** BE WELL GROUNDED. USE THE GREEN GROUND SCREW PROVIDED AT THE ELECTRICAL CONNECTION POINT FOR CONNECTING A GROUND WIRE.

System Description

The operation of the ICON E™ Electronic Control system is unlike that of the traditional snap disc thermostats in several ways. Troubleshooting the operation of the control differs from the older models.

Power-Up

When the control is initially powered, it will go through several stages. Upon any power-up cycle the LED will flash rapidly in an Amber-Green pattern as the control undergoes an initial 5 second sequence to initialize and ensure everything in the control is working correctly. If the water heater is new and has never run a heating cycle, or if the heater was drained to replace a burned out heating element, the control will run StartGuard™ prior to heating the water. **The control will enter StartGuard™ only if the Setpoint Knob is moved after power is applied and set to a temperature that calls for the heating elements to turn on. StartGuard™ will test to ensure the tank is full of water and the elements are functioning correctly.** The test is indicated by an Amber-Green flash pattern and should take less than 5 minutes. After the initial power-up cycles finish, the control moves into normal operation indicated by a single green flash on the LED. To heat up the tank the water heater begins by first turning on the upper element.

Normal Operation

The pattern of element operation for the ICON E™ system is similar to that of a traditional Bi-metal disk water heater. It prioritizes heating the upper portion of the tank to allow for faster recovery of the water heater when depleted. This means that upon startup the water heater begins by heating up the upper portion of the tank and then moves to recover the bottom to setpoint temperature. When the water heater is already hot and experiences a draw it will begin by turning on the lower element and if the tank continues to be depleted past a certain point it will switch to the upper element until it satisfies the upper portion of the tanks demand. At this point the heater will recover the lower portion of the tank to setpoint temperature.

CTA 2045 (For Applicable Models)

Caution

THE CTA CONNECTOR HAS LIVE LINE VOLTAGE POWERED PINS. POWER OFF WATER HEATER BEFORE INSTALLING CTA UNIVERSAL COMMUNICATION MODULE (UCM).

Some controls are equipped with a CTA 2045 port which enables the ICON E™ system to communicate with a Universal Communication Module (UCM). Your local electrical utility provider may offer a Demand Response Management (DRM) program that allows your provider to offload power into your water heater or to temporarily delay the recovery of the water heater in order to help regulate demands on the power grid. This system, if used, will interact with your water heater in one of two ways. First is the Load-Up command, which will make sure that your water heater fully recovers to setpoint. Second, it can issue a Load Shed command. A Load Shed command may cause the water in the tank to cool off more than it normally would before recovering, potentially resulting in less available hot water. You will be able to tell if the water heater is operating in a Load Shed command by looking at the status LED. If you see a flash pattern of 6 amber flashes followed by a 4 second off period, the control is operating under a Load Shed command. If this performance is undesirable and you would like to temporarily disable it, move the Setpoint knob to some other temperature and then return it to the desired setpoint.. This will allow the water heater to operate normally for 72 hours.

DRM programs offered by electric utility providers typically require that the water heater have a setpoint temperature of 140 °F or higher. Water temperatures of 140 °F and above will scald in five seconds or less, causing severe burns or even death. It is highly recommended that an ASSE approved thermostatic mixing valve be installed when operating a water heater at these higher temperatures.
Note: When a mixing valve is installed, the temperature of the hot water delivered to the home is determined by the mixing valve. If the hot water temperature is inadequately low, check the mixing valve first. There is a setpoint adjustment mechanism on all mixing valves that adjusts the blend of hot water (from the water heater) and cold water (from cold water pipes) that results in the hot water temperature delivered to the hot water distribution pipes. If hot water at the tap is too cool, check and adjust the mixing valve to a hotter setpoint. If water from the water heater is hot and the delivered hot water at the tap is cold, the mixing valve is likely the cause.

Installation of CTA Module:
1) Turn off power to water heater
2) Remove CTA connector cover by removing the screws that attach the cover.
3) Plug UCM device into the CTA Port and attach to the water heater via screws provided with the UCM
4) Apply power to the water heater

High Limit (ECO)/Upper Temperature Sensor

The surface mounted High Limit (Electrical Cut-Out) and Upper Temperature Sensor assembly is mounted in the upper handhole of the water heater by a bracket which holds it against the side of the tank.
The Upper Temperature Sensor and the High Limit (ECO) both respond to tank surface temperatures. For the Upper Temperature sensor this means letting the controller know when to either call for heat or when to indicate that the tank it satisfied. In the case of the High Limit (ECO) it cuts power to the heating elements if the temperature exceeds a predetermined temperature (High Limit). It is important that the entire back surface of the High Limit and temperature sensor are in full contact with or flush to the surface of the tank. An improperly mounted High Limit (ECO) or Upper Temperature Sensor will lead to improper water heater operation.

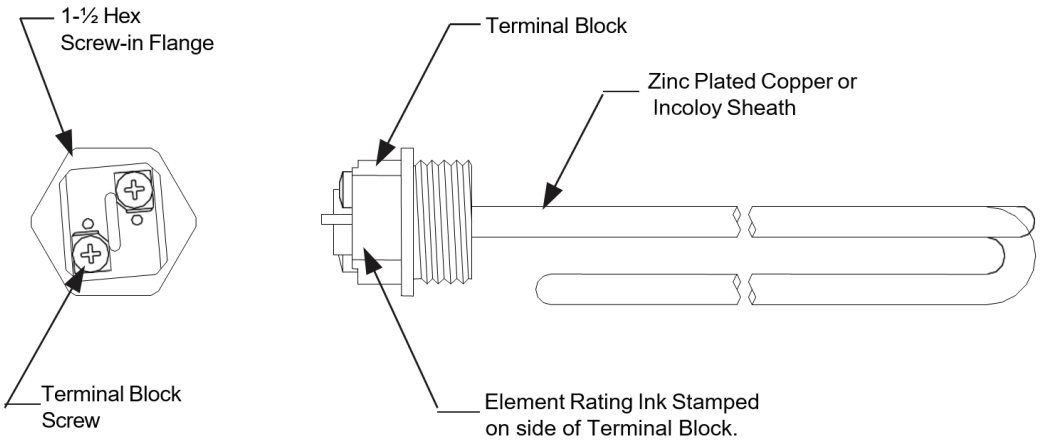
Power Switch Module

The surface mounted Power Switch Module is an assembly that consists of the lower temperature sensor, and solid-state switches that control power to the heating elements. The Power Switch Module receives signals from the Control Module to turn On/Off power to the upper and lower heating elements. Temperature readings from the Power Switch Module are used by the Control Module to determine when to turn On/Off the Heating Elements. The Power Switch Module is mounted in the lower handhole via a spring clip and retaining lever. Good thermal contact from the Power Switch Module to the tank wall is critical to the proper operation of the water heater. It is important that the tank wall is free of debris and that an adequate layer of thermal paste is applied between the tank wall and the Power Switch Module.

Control Module

The Control Module, located in the plastic upper handhole cover, is the main circuit board in the ICON E™ Electronic Control system. The Control Module does the thinking for the control system, reads the temperature sensors, and controls the elements. It also reads the user setpoint temperature and displays user notifications using an LED. It's important to make sure that the connectors are properly connected to the Control Module to ensure proper operation.

Direct Immersion "Screw-in" Type Heating Element



General Troubleshooting Table

LED Status	Control Status	Probable Cause*
OFF (LED not flashing)	No power is present to control	1) Power is not connected to water heater. 2) Control power connector is disconnected.
Alternating Green and Amber Flashes	Control is in StartGuard™ Mode. This mode runs prior to the first heating cycle or after replacing a failed heating element.	Power was recently applied following detection of a failed heating element OR the water heater is powered and is turning on heating elements for the first time by a new controller. If this LED status persists for significantly longer than 5 minutes, there may be air in the tank or the control may be damaged.
Solid Green	Thermostat satisfied: No faults	Water heater is operating normally.
1 Flash Green then off for 4 seconds	Element is on, heating water	Water heater is operating normally.
2 Flashes Amber then off for 4 seconds	Heating element fault detected	Element malfunction
3 Flashes Amber then off for 4 seconds	Power Switch Module Fault Detected	1) Power Switch Module is not tightly coupled to tank wall. 2) Power Switch Module is not functioning correctly.
4 Flashes Amber then off for 4 seconds	Temperature Sensor Fault Detected	1) Upper Temperature Sensor is disconnected. 2) Power Switch Module disconnected. 3) High Temperature limit has switched open.
5 Flashes Amber then off for 4 seconds	Controller Fault Detected	Controller not functioning properly.
6 Flashes Amber then off for 4 seconds	Demand Response Event Active	The CTA device connected to the water heater is controlling the setpoint. If you find that the tank is too cold, move the Setpoint Knob and the control will resume normal operation.
7 Flashes Red then off for 4 seconds	High Temperature Detected	Upper or lower temperature sensor has detected an excessive temperature.

*for additional diagnostic steps see the corresponding steps in “Flash Code Utilization for Basic Troubleshooting”.

Flash Code Utilization for Basic Troubleshooting

OFF (LED Not Flashing):

1) Turn “OFF” power to the water heater.
2) Make sure that power is applied to the water heater, if that fails, continue with the next step
3) Remove Control Module retaining screw and inspect the connectors on the back of the Control Module, making sure that they are properly connected.
4) Inspect the wires leading to the High Limit making sure they are all properly fastened as per the wiring diagram on the back of the Control Module.
5) Reinstall the Control Module and reapply power to the water heater.
6) If problems persist, Replace the Control Module by following the instructions on page 17.

Alternating Amber-Green Flashes:

1) Make sure tank is fully purged of air.
2) Turn “OFF” power to the water heater.
3) Remove the lower handhole cover.
4) Inspect the Power Switch Module to ensure tight coupling to the tank wall.
5) Replace the handhole cover.
6) Re-apply power to the water heater.
7) If the problem persists, the Control Module needs to be replaced. Follow the procedure outlined on page 17.

Solid Green:

If the control is reading solid green and there is still no hot water, move the Setpoint Knob around and turn it back to the desired setpoint. This should enable the water heater to enter StartGuard™ which will be indicated by alternate Amber-Green flashes. Or if StartGuard™ has already ran, you should see a single Green Flash indicating that the water heater is currently heating.

2 Flash Amber code:

1) Turn “OFF” power to the water heater.
2) Check elements with multimeter as shown on page 12
3) Drain water from the tank.
4) Take out elements and inspect them for damage. Replace if necessary.
5) Install and re-wire elements
6) Replace insulation and hand-hole covers.
7) Refill tank and check for leaks.
8) Re-apply power to the water heater.

⚠ WARNING
High voltage exposure. Use caution when making voltage checks to avoid personal injury.

3 Flash Amber code:

1) Turn “OFF” power to the water heater.
2) Remove Control Module retaining screw and inspect the 5 pin connector on the back ensuring a good connection and that no pins are damaged on the Control Module.
3) Remove the lower handhole cover and check the 3 pin connector on the Power Switch Module, ensuring that the connector is properly attached and there are no damaged pins on the Power Switch Module.
4) If connectors were not properly attached, reattach, and skip to step 6.
5) If connectors were properly attached, disconnect the three wires at the lug terminals on the power switch module.
6) With a multimeter set to the ohms (Ω) setting, check the resistance between terminals 1 and 2 on the Power Switch Module, as well as terminals 1 and 3. The resistance should be around 50-80MΩ for each. If the values are lower than that or if there is a large discrepancy between the two measurements, follow the procedure to replace the Power Switch Module as shown on (page 17)
7) Replace the handhole cover and insulation and button up the water heater.
8) Re-apply power to the water heater.

4 Flash Amber code:

1) Turn “OFF” power to the water heater.
2) Remove Control Module retaining screw and check to see that the 5-pin connector is properly seated.
3) If the connector is properly seated, disconnect the control module from the 2 pin and 5 pin connectors.
4) Remove the insulation from the handhole.
5) Inspect the connector for the upper temperature sensor and make sure there are no broken or disconnected wires. If there is damage or a displaced connector, replace the connector.
6) With a multimeter set to the ohms (Ω) setting, measure the resistance between the two terminals of the temperature sensor. Depending on the temperature of the tank wall, a reading should be somewhere between 1.2kΩ if the tank is quite hot to around 33kΩ if the tank is quite cold. If sensor is out of this range, follow the instructions to replace the temperature sensor. If the sensor is in range, and everything is connected, replace the upper temperature sensor and the Power Switch Module.

5 Flash Amber code:

1) Move the Setpoint Knob back and forth several times.
2) Cycle power to the water heater
3) If problem persists, replace the control module.

6 Flash Amber code:

1) If the 6 flash amber code is present, it is okay to leave it as is if the performance of the water heater is to your satisfaction. If the performance is inadequate, move the Setpoint Knob and then move it back to its initial position and the water heater will resume its normal operation.

7 Flash Red code:

1) Turn “OFF” power to the water heater.
2) Ensure the tank is filled with cold water.
3) Open the upper handhole cover and check to see if the high limit switch is tripped by following the instructions in the High Limit (ECO) Testing section on page 13.
4) Inspect connections to the Upper Temperature sensor by following the instructions in the Upper Temperature Sensor Testing section on page 17
5) Open the Lower handhole cover and follow the instructions on Power Switch Module (PSM) Testing on page 16.
6) Repeat step 4, this time checking between terminals 1 and 3.
   (NOTE) Even if the Power Switch Module is determined to be non-functioning, check the elements for functionality. This should be done as a potential cause of a bad Power Switch Module is a faulty element.
7) If everything appears to be functioning normally, apply power to the water heater and turn the control to a setpoint that will allow the control to enter StartGuard™.

Most common cause for improper electric water heater operation can be linked to heating element failure.

When troubleshooting an electric water heater with the incidence of “No Hot Water” or “Insufficient Amount of Hot Water,” It’s always a good idea to check the heating elements first by following the procedure on page 12.

Common Heating Element Failures:

1. **Dry Firing.** Heating elements must be fully submerged in water before operating at full power. If a heating element is left partially submerged or completely unsubmerged and allowed is run at full power, the heating element will be subject to excessive temperatures that will damage or destroy the heating elements. ICON E™ Electronic Control has smart control features to protect heating elements on initial installation, when a heating element is replaced, or if the tank is periodically drained for service.

2. **Grounded Element.** An element with a short circuit to ground will in most cases cause the circuit breaker in the service panel to open or shut off. In some cases, there may not be enough current draw for the circuit breaker to open. This will allow the heating element to be in continuous operation resulting in over heated water, limited only by the ECO or Energy Cut Out. Repeated actuation of the ECO is usually the result of a grounded element.

3. **Sediment build-up.** Slow hot water recovery can usually be traced back to sediment or lime build up around heating element. Sediment build up can also over time cause a dry fired element.

Figure 1 below shows a common “Screw-In” type heating element identifying certain features commonly referred to throughout this manual.

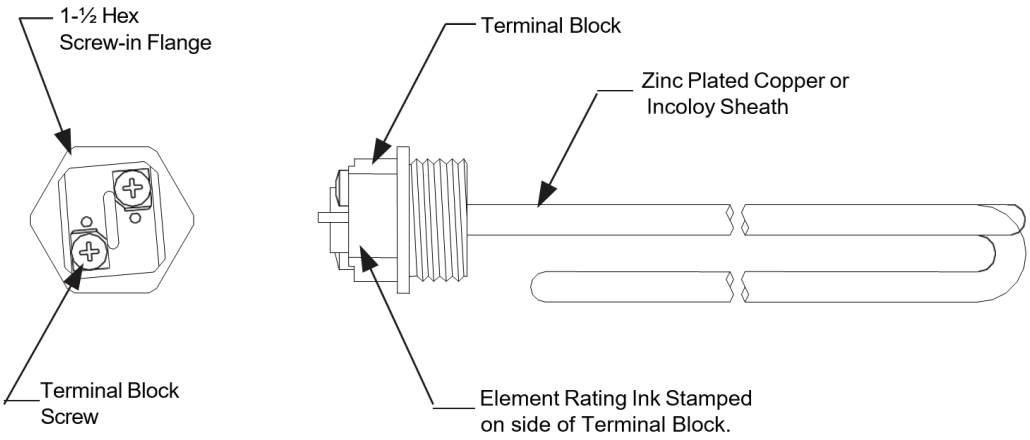


Figure 1
Typical Direct Immersion “Screw-In” Type Heating Element

Quick Step to Hot Water

⚠ WARNING
High voltage exposure. Use caution when making voltage checks to avoid personal injury.

1. TURN OFF power to water heater and check all wire connections to ensure they are tight and corrosion free.
2. Turn power "ON" and determine that service voltage is present, and the high limit (ECO) has not actuated.
3. Check for inoperative heating element.
4. Check for proper High Limit (ECO) operation. NOTE: High Limit (ECO) testing procedures assume items 2 and 3 above are in working order.

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
No Hot Water	1) No power to heater. 2) Loose wire connections. 3) Inoperative heating elements. 4) Inoperative Power Switch Module 5) Open High Limit (ECO)	1) Check all fuses or circuit breakers in service panel. 2) Check all wire connections. 3) Check heating element(s). Replace as needed. 4) Check Power Switch Module operation. Replace as needed. 5) Check High Limit (ECO). Reset or replace if needed.
Not Enough Hot Water	1) Temperature set too low. 2) Inoperative lower heating element. 3) Loose wire connection 4) Sediment or lime buildup on element(s). 5) High demand period. 6) Undersized water heater. 7) Very cold inlet water to heater. 8) Plumbing connections reversed. 9) Damaged dip tube.	1) Increase temperature setting 2) Check heating element(s). Replace as needed. 3) Check all wire connections. 4) Reduce demand. 5) Replace with larger water heater. 6) Temper water to heater. 7) Correct plumbing connections 8) Check dip tube. Replace as needed.
Slow Hot Water Recovery	1) Sediment or lime buildup on element(s). 2) Loose wire connections. 3) Derated heating element installed 4) Inoperative element(s) 5) Poorly coupled Power Switch Module.	1) Check heating element(s). Replace as needed. 2) Check all wire connections. 3) Check Power Switch Module operation. Replace as needed.
Over Heated Water or Continuous Operation	1) Temperature set too high. 2) Upper temperature sensor not in contact with tank. 3) Grounded heating element(s). 4) Inoperative Power Switch Module. 5) Inoperative High Limit (ECO). 6) Undersized water heater.	1) Reduce temperature setting. 2 Check upper temperature sensor, ensure good contact with tank. 3) Check heating element(s). Replace as needed. 4) Check Power Switch Module operation. Replace as needed. 5) Replace with larger water heater.
Noisy (singing or hissing) Elements	1) Lime formation on elements.	1) Remove and clean heating elements. Replace as needed.

Line Voltage Testing

⚠ WARNING
High voltage exposure. Use caution when making voltage checks to avoid personal injury.

1. Turn “OFF” the power to the water heater.

2. Remove access cover(s) from front of water heater. This is done by sliding a flathead screwdriver underneath the latch at the top of the cover. Remove insulation and plastic cover from the High Limit (ECO).

3. Set multi-meter to “Volts AC.”

4. Turn power “ON” to water heater.

5. Check voltage across terminals 1& 3 of the High Limit (ECO) (see Figure 2).

   A) Rated voltage IS present, power to the water heater is okay.

   B) Rated voltage NOT present, Check circuit breaker at service panel.

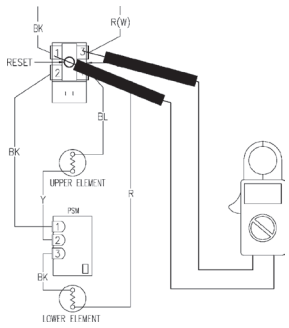


Figure 2

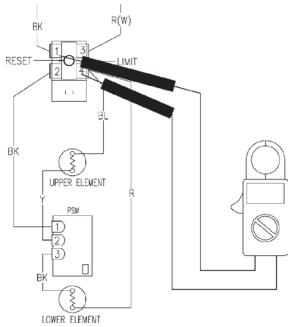


Figure 3

High Limit (ECO) Testing

1. Check voltage across terminals 1 & 4 of the High Limit (ECO) (see Figure 3).

   A) Rated Voltage IS present, ECO is okay.

   B) Rated voltage NOT present, proceed to step 2.

2. Turn power “OFF” to water heater and firmly press ECO reset button on the High Limit (ECO). Turn power “ON” and recheck voltage across terminals 1 & 4 of the High Limit (ECO) (see Figure 3).

   A) Rated Voltage IS present, the ECO has previously opened indicating the water in the tank, at some point did overheat, review the steps in the 7 Flash Red Code section

   B) Rated voltage NOT present, water in tank may be over heated.
      1. If water is hot, turn “OFF” power to water heater and flow water through tank to cool below set point of the High Limit (ECO). Recheck voltage per step 1.

      2. If water is cool, Replace the High Limit (ECO).

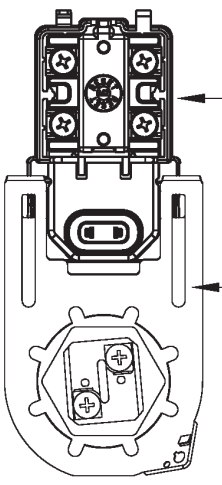
High Limit Removal

⚠ WARNING
High voltage exposure. Be sure power is "OFF" when performing this procedure.

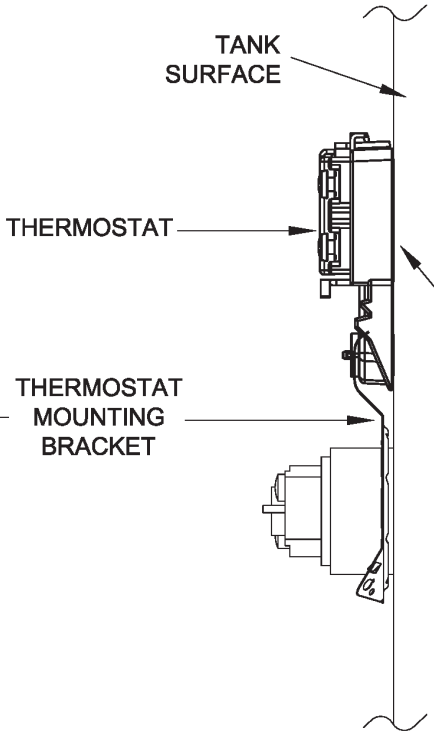
1. Turn power "OFF" to water heater.
2. Remove access cover and insulation.
3. Remove plastic protector from the High Limit (ECO). This can be done by sliding a flathead screwdriver underneath the latch at the top, then sliding the screwdriver down to remove.
4. Disconnect wires from the High Limit (ECO) terminals. It may be necessary to label wires for proper re-connection to new High Limit (ECO).
5. Pull the two sides of the bracket back and slide the High Limit (ECO) upwards and out of the mounting bracket.

High Limit Replacement

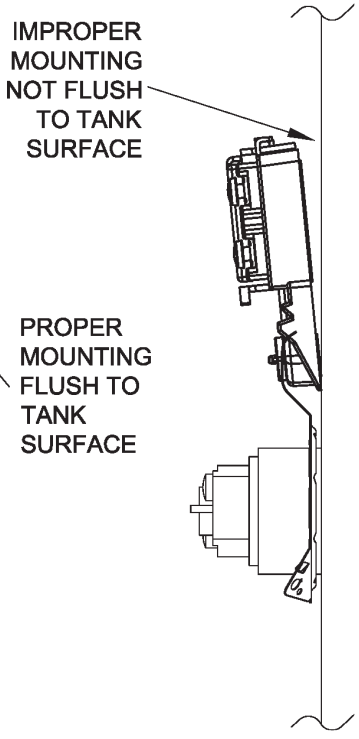
1. Use a stiff brush to remove any debris or loose scale from tank surface where new the High Limit (ECO) will be installed.
2. Slide the new High Limit (ECO) down into the bracket until it snaps into place. IMPORTANT! the High Limit (ECO) must sit completely flat or flush to tank surface. An improperly installed High Limit (ECO) will cause improper water heater operation.
3. Refer to the wire diagram located on the inside of the access cover and reconnect wires to the High Limit (ECO). Be sure wire connections are snug and corrosion free. Do not over tighten, doing so may damage the High Limit (ECO).
4. Re-install plastic protector.
5. Re-install insulation and access cover.
6. Restore power to water heater and verify proper heater operation.



Front View the High Limit (ECO) Mounting



Side View Proper Mounting



Side View Improper Mounting

Testing For Open Or Burned Out Element

⚠ WARNING
High voltage exposure. Be sure power is turned OFF to water heater prior to performing this procedure.

Step 1. **TURN OFF POWER TO WATER HEATER**

Step 2. Remove access cover(s) from front of water heater. This is done by sliding a flathead screwdriver underneath the latch at the top of the cover. Remove insulation and plastic cover from the High Limit (ECO).

Step 3. Disconnect wires from heating element(s).

Step 4. Set multi-meter to “ohms” setting.

Step 5. Touch probes of multi-meter to screw terminals of heating element(s) (see Figure 4).

Step 6. Reading should be 12.8 ohms (±6%) for a 240 volt, 4500 watt element:

$$\text{Ohms} = \frac{\text{Volts}^2}{\text{Watts}}$$

A reading outside the range using the formula beyond (±6%), indicates a bad element and the element must be replaced.

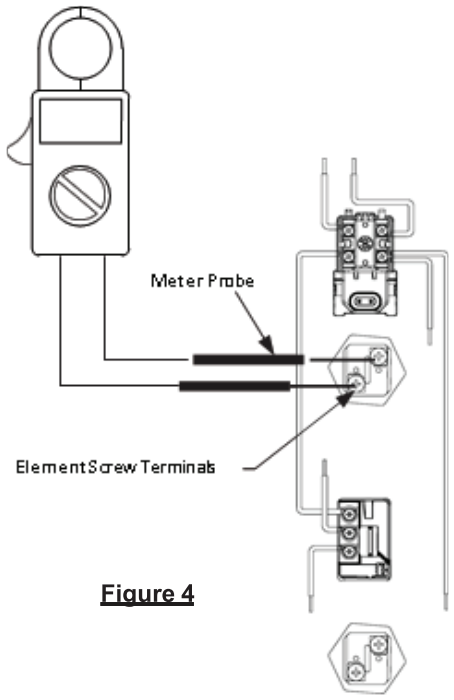


Figure 4

Testing For Heating Element Short Circuit To Ground

Step 1. **TURN OFF POWER TO WATER HEATER**

Step 2. Remove access cover(s) from front of water heater. Remove insulation and plastic cover from the High Limit (ECO).

Step 3. Disconnect wires from heating element(s).

Step 4. Set multi-meter to “ohms” setting.

Step 5. Touch probes of the multi-meter to the screw terminal of heating element and the other on the element flange (see figure 5). There should be no reading on the ohm meter. Any reading indicates a grounded element and the element must be replaced. Repeat this step for the other screw terminal.

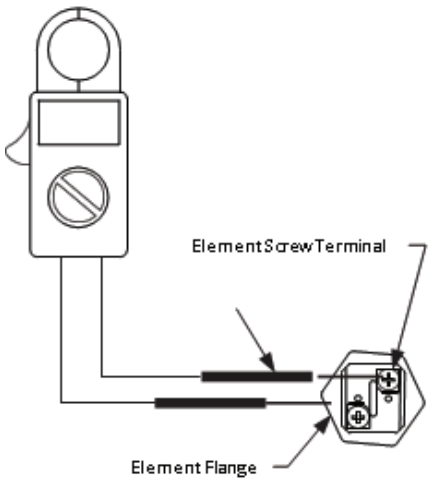


Figure 5

⚠ WARNING
High voltage exposure. Be sure power is "OFF" when performing this procedure.

Power Switch Module (PSM) Testing

1. Turn all power to the water heater "OFF"
2. Remove lower access cover and insulation from inside the hand hole.
3. Disconnect the wires at the three screw terminals
4. Set the multi-meter to the Ohms (Ω) setting.
5. Check resistance between terminals 1 and 2 (Figure 6), as well as terminals 1 and 3 (Figure 7) on the Power Switch Module. This should read somewhere between 25MΩ-150MΩ depending on the quality of multimeter used.
   a. If the resistances fall within the specified range and are approximately equal between the two measurements the Power Switch Module is functioning properly.
   b. If one or both of the measurements are out of that range, or they are significantly different (i.e one measurement reads 50MΩ and the other reads 80MΩ) then the power switch should be replaced.

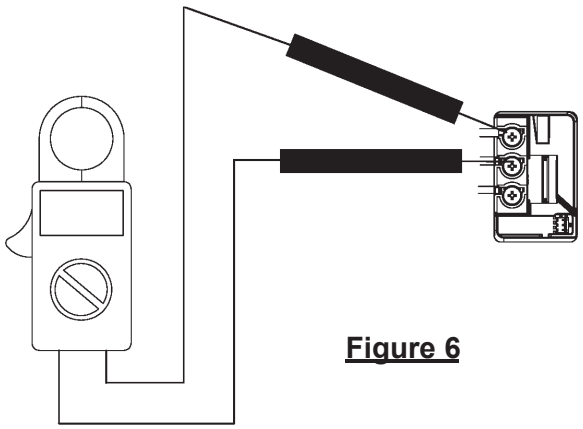


Figure 6

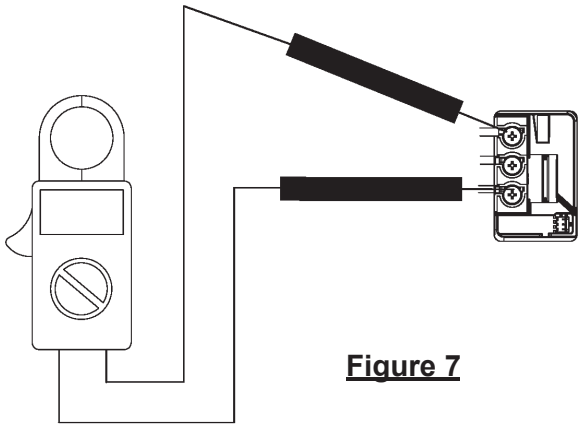


Figure 7

⚠ WARNING
High voltage exposure. Be sure power is "OFF" when performing this procedure.

Upper Temperature Sensor Testing

1. Turn all power to the water heater "OFF".
2. Remove access cover to upper handhole and remove insulation
3. Check the 5 pin connector on the back of the control to ensure it is connected properly by removing the connector, inspecting the pins on the control board, and carefully reseating the connector.
4. Either remove the shock protector or flip the protective lid up to access the temperature sensor.
5. Inspect the temperature sensor to make sure that it's firmly affixed to the tank wall and that the connectors attached to the wire harness are in good condition.
6. Set the multi-meter to Ohms (Ω).
7. Check the resistance between the two leads (Figure 8). Depending on the tank temperature, the sensor should read between 1.2kΩ and 33kΩ.
    a. If the resistance is out of this range, the temperature sensor and upper limit assembly needs to be replaced.
    b. If the resistance is within this range and the connectors look good the upper temperature sensor is functioning properly.
8. Replace shock protector, insulation, and upper handhole access cover.

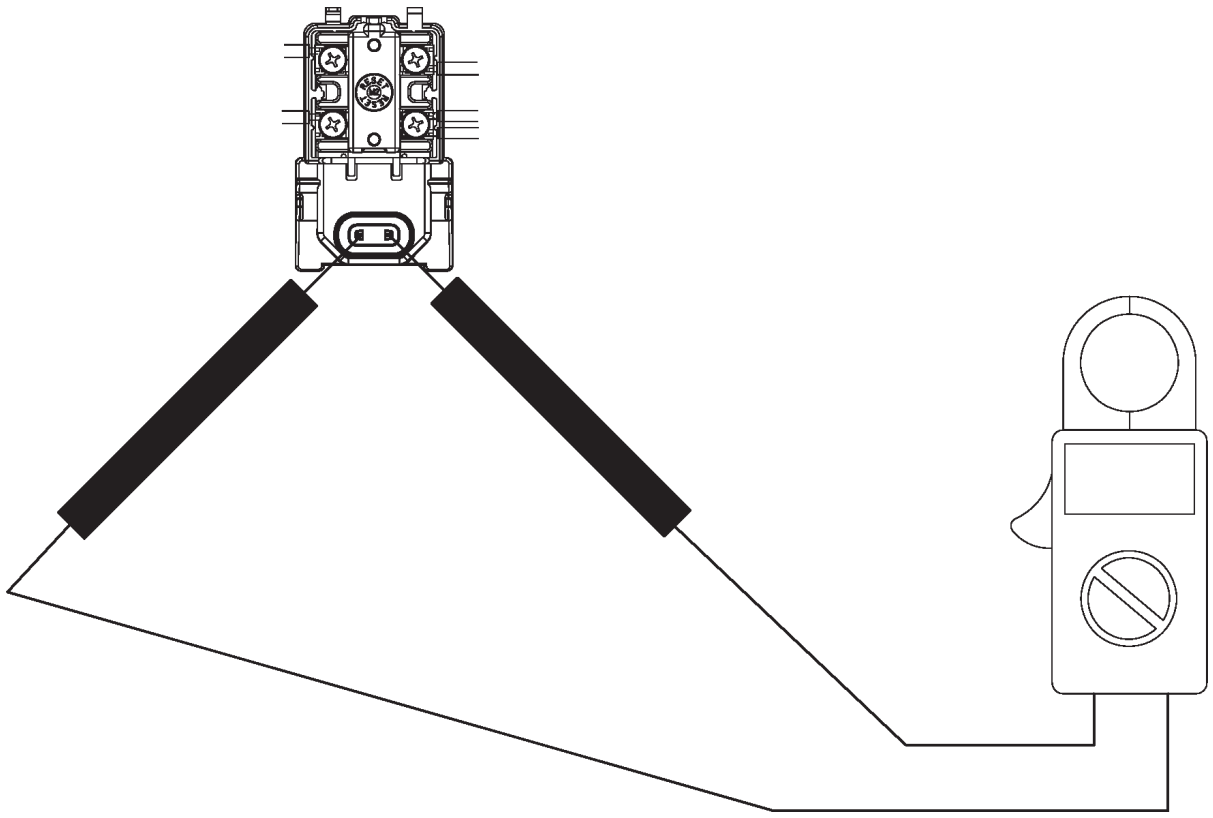


Figure 8

⚠ WARNING
High voltage exposure. Be sure power is "OFF" when performing this procedure.

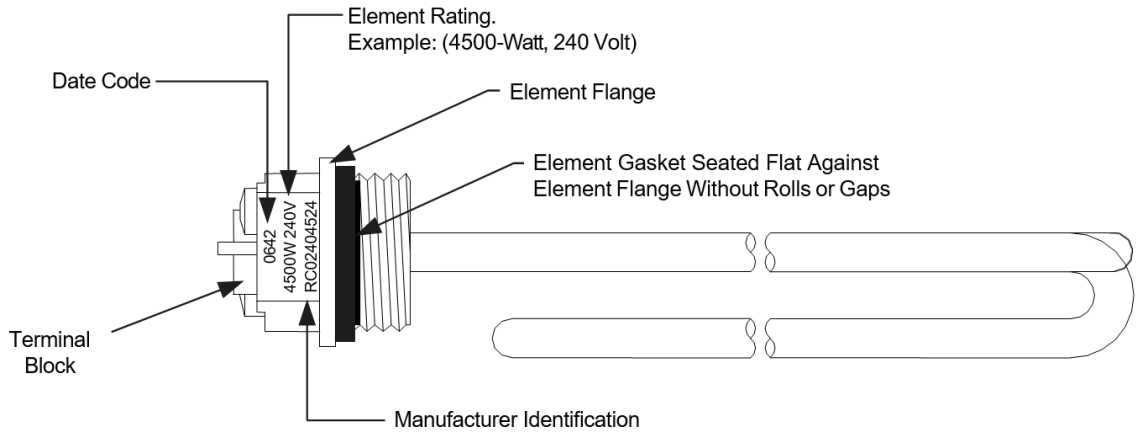
⚠ WARNING
Heater components and stored water may be HOT when performing the following steps in this procedure. Take necessary precaution to prevent personal injury.

Heating Element Removal

1. Turn power "OFF" To water heater.
2. Turn off cold water supply to heater. Connect hose to drain spigot of water heater and route to an open drain. Open a nearby hot water faucet to vent heater for draining. Open drain spigot of water heater and allow heater to drain to a point below the element(s).
3. Close drain spigot and remove hose.
4. Remove access cover and insulation.
5. Remove plastic protector from the High Limit (ECO). This can be done by sliding a flathead screwdriver underneath the latch at the top, then sliding the screwdriver down to remove.
6. Disconnect wires from element terminals.
7. Remove element from tank using 1-½ deep well socket or appropriate wrench. Unscrew element counter-clockwise to remove from tank.
8. Be sure to remove old element gasket from the tank. It is not recommended to be re-used.

Heating Element Replacement

1. Check element terminal block for proper electrical rating. NOTE: Some elements have dual ratings, be sure to check all surfaces of the element terminal block (see illustration below).
2. Apply new element gasket to the new element. Be sure gasket is seated flat against element flange without rolls or gaps (see illustration below).
3. Clean any debris from element fitting on tank. Lubricate element threads as needed with thread lubricant.
4. Thread new element clockwise into tank. Tighten element using 1-½ deep well socket or appropriate wrench. Do not over tighten, over tightening may damage element gasket.
5. Reconnect wires to element, be sure wires are snug and corrosion free. Do not over tighten, doing so may damage terminal block.
6. Resume water supply to heater, be sure tank is full of water and check for leaks.
7. Re-install plastic High Limit (ECO) protector.
8. Re-install insulation and access cover.
9. To resume operation, **BE SURE TANK IS FULL OF WATER** and restore power to water heater. Verify proper heater operation.



Power Switch Module Removal and Replacement

Step 1. Turn power “OFF” to water heater.

Step 2. Remove Screw at top of control module cover.

Step 3. Remove insulation that is behind the cover.

Step 4. Remove wires from the Control module. Noting where the wires go.

Step 5. Take new cover and reverse the procedure to replace the control module.

Diptube Inspection and Replacement

⚠ WARNING
Heater components and stored water may be HOT when performing the following steps in this procedure. Take necessary precaution to prevent personal injury.

Step 1. Turn power “OFF” to water heater.

Step 2. Turn off cold water supply to heater. Connect hose to drain spigot of water heater and route to an open drain. Open a nearby hot water faucet to vent heater for draining. Open drain spigot of water heater and allow heater to drain to a point below the inlet connection nipple.

Step 3. Close drain spigot and remove hose.

Step 4. Disconnect inlet nipple from plumbing system.

Step 5. With an appropriate wrench, remove inlet nipple/dip tube from the water heater. Use caution not to damage nipple threads.

Step 6. Visually inspect inlet nipple/dip tube. Inlet nipple/dip tube should be free of cracks and any blockage. Hydro-jets located near the bottom of the dip tube should be open and free of any blockage. Anti-siphon hole located approximately 6" from the bottom of nipple, should be free of any blockage.

Any damage such as cracks, restriction due to deformation or unintentional holes are not field repairable and the inlet nipple/dip tube must be replaced.

Step 7. Upon completion of inspection or subsequent replacement, reinstall inlet nipple/dip tube into heater. Ensure pipe dope is used on the nipple’s threads. Connect nipple to plumbing system, close spigot and remove drain hose, resume water supply and refill heater with water.

Step 8. To resume operation, **BE SURE TANK IS FULL OF WATER** and turn power “ON” to water heater.

Anode Inspection and Replacement

Step 1. Turn power "OFF" to water heater.

Step 2. Turn off cold water supply to heater. Connect hose to drain spigot of water heater and route to an open drain. Open a nearby hot water faucet to vent heater for draining. Open drain spigot of water heater and allow heater to drain to a point below the outlet connection nipple.

Step 3. Close drain spigot and remove hose.

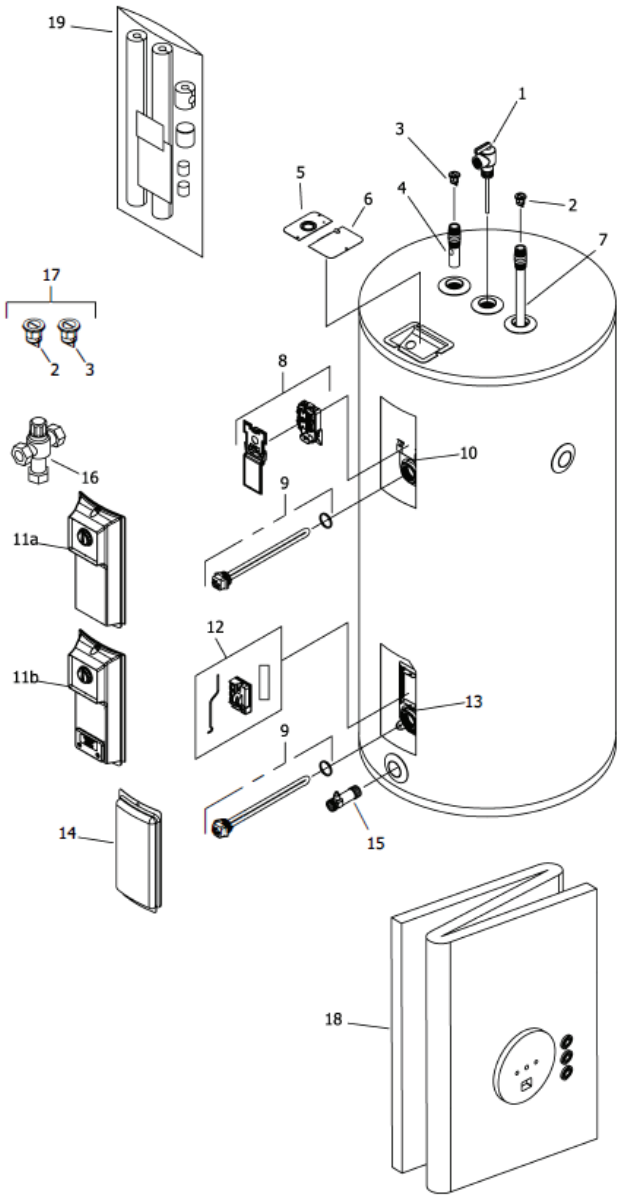
Step 4. Disconnect outlet nipple from plumbing system.

Step 5. With an appropriate wrench, remove outlet nipple/anode from the water heater. Use caution not to damage nipple threads.

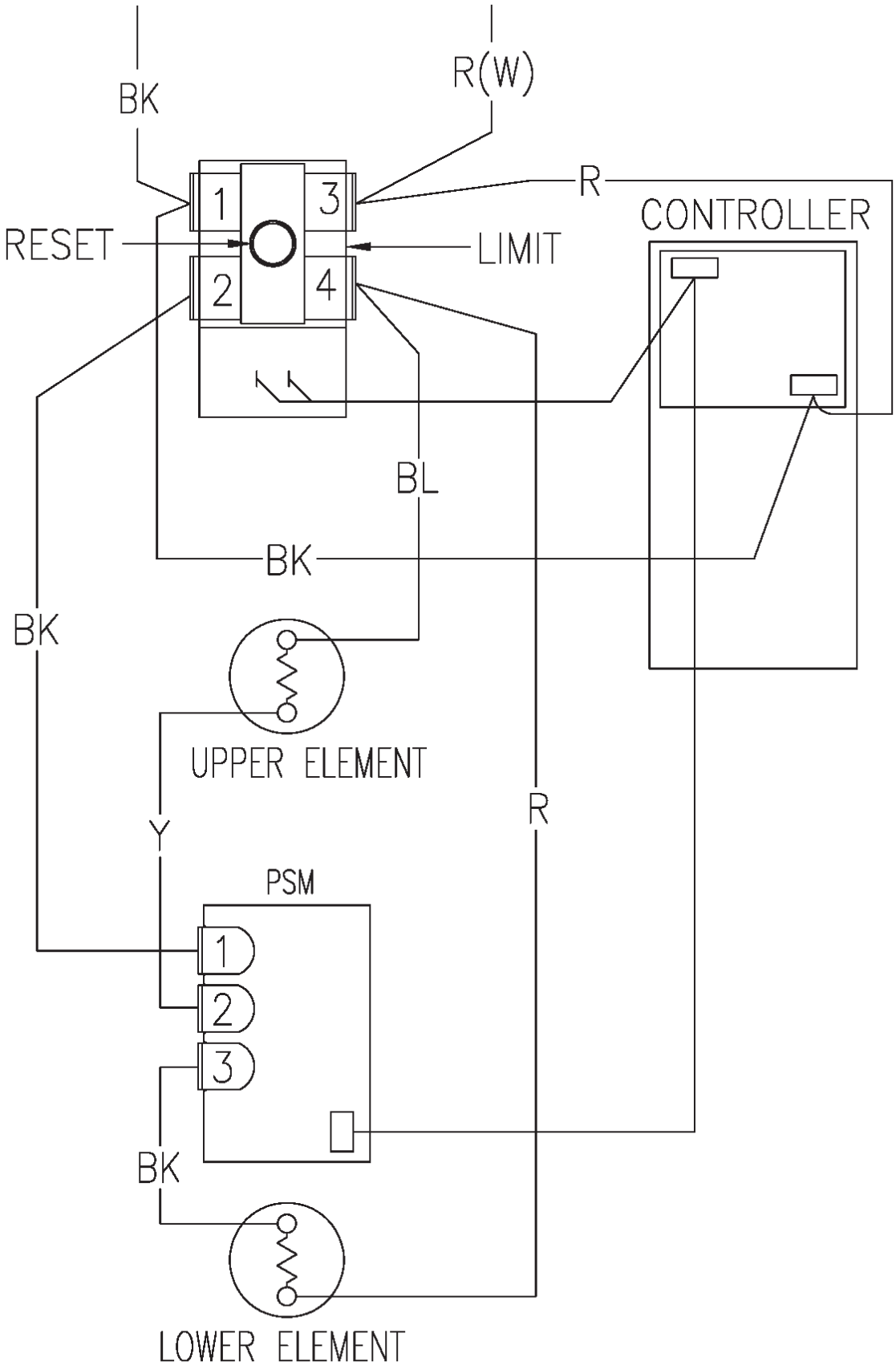
Step 6. Visually inspect outlet nipple/anode. Outlet nipple/anode should show signs of depletion, this is normal. If depletion is ½ of the original anode diameter (original diameter approximately ¾"), replacement is recommended. If any of the steel core of the anode is exposed, replacement is recommended.

Step 7. Upon completion of inspection or subsequent replacement, reinstall outlet nipple/anode into heater. Ensure pipe dope is used on the nipple's threads. Connect nipple to plumbing system, close spigot and remove drain hose, resume water supply and refill heater with water.

Step 8. To resume operation, **BE SURE HEATER IS FULL OF WATER** and turn power "ON" to water heater.



1. T&P Relief Valve
2. Heat Trap Insert (Outlet)
3. Hot Water Outlet/Anode
4. Cover Conduit/Ground
5. Junction Box Cover
6. Heat Trap Insert (Inlet)
7. Cold Water Inlet Diptube
8. High Limit (ECO) with Protector
9. Heating Element with Gasket
10. High Limit (ECO) Mounting Bracket
11. Controller Cover Assembly
12. Power Switch Module (PSM)
13. PSM Mounting Bracket
14. Access Cover
15. Drain Valve
16. ASSE Approved Mixing Valve
17. Kit – Heat Trap Insert (PEX)
18. Kit – Blanket
19. Kit – Insulation



BRADFORD WHITE WATER HEATERS

NOTES

BRADFORD WHITE®
WATER HEATERS

United States

Sales	**800-523-2931**
Technical Support	**800-334-3393**
Email	***techserv@bradfordwhite.com***
Warranty	**800-531-2111**
Email	***warranty@bradfordwhite.com***
Service Parts	**800-538-2020**
Email	***parts@bradfordwhite.com***

Canada

Sales & Technical Support	**866-690-0961 905-203-0600**
Fax	**905-636-0666**
Warranty	***bwccwarranty@bradfordwhite.com***
Technical Support	***bwcctech@bradfordwhite.com***
Service Parts	***orders@bradfordwhitecanada.com***
Orders	***ca.orders@bradfordwhite.com***

For U.S. and Canada field service,
contact your professional installer or
local Bradford White sales representative.

International

General Contact ***international@bradfordwhite.com***

©2023, Bradford White Corporation, USA. All rights reserved. **www.bradfordwhite.com**