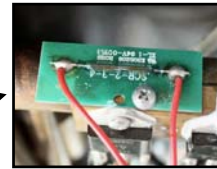


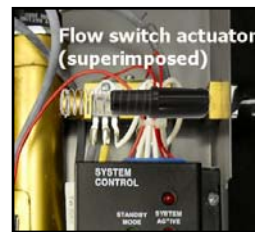


Tankless Electric (RTE) Troubleshooting

Sequence of Operations



- 1 – Power supply and field wiring block
- 2 – Energy Cut Off (ECO)
- 3 – Water flow plunger and cold inlet
- 4 – Magnetic flow switch
- 5 – Water temperature thermistor
- 6 – Control panel and circuit board
- 7 – Silicon Controlled Rectifiers (SCRs)
- 8 – Heating elements
- 9 – Hot outlet

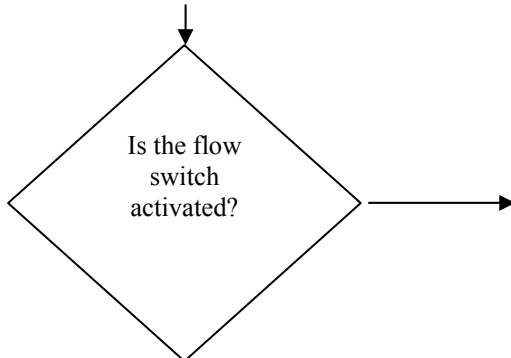


Unit is properly installed. Has 120VAC (RTE3 only) or 240 VAC power connected to field wiring block (1). 120 VAC (one leg) is always ON thru ECO (2) and to one terminal of the heating element (s)(8).

Check for 240 VAC at field wiring block. Check for 120 VAC to ground at one of the screws on the heating element. The GREEN light on the control board should be ON.

Hot water demanded from a fixture creates flow.

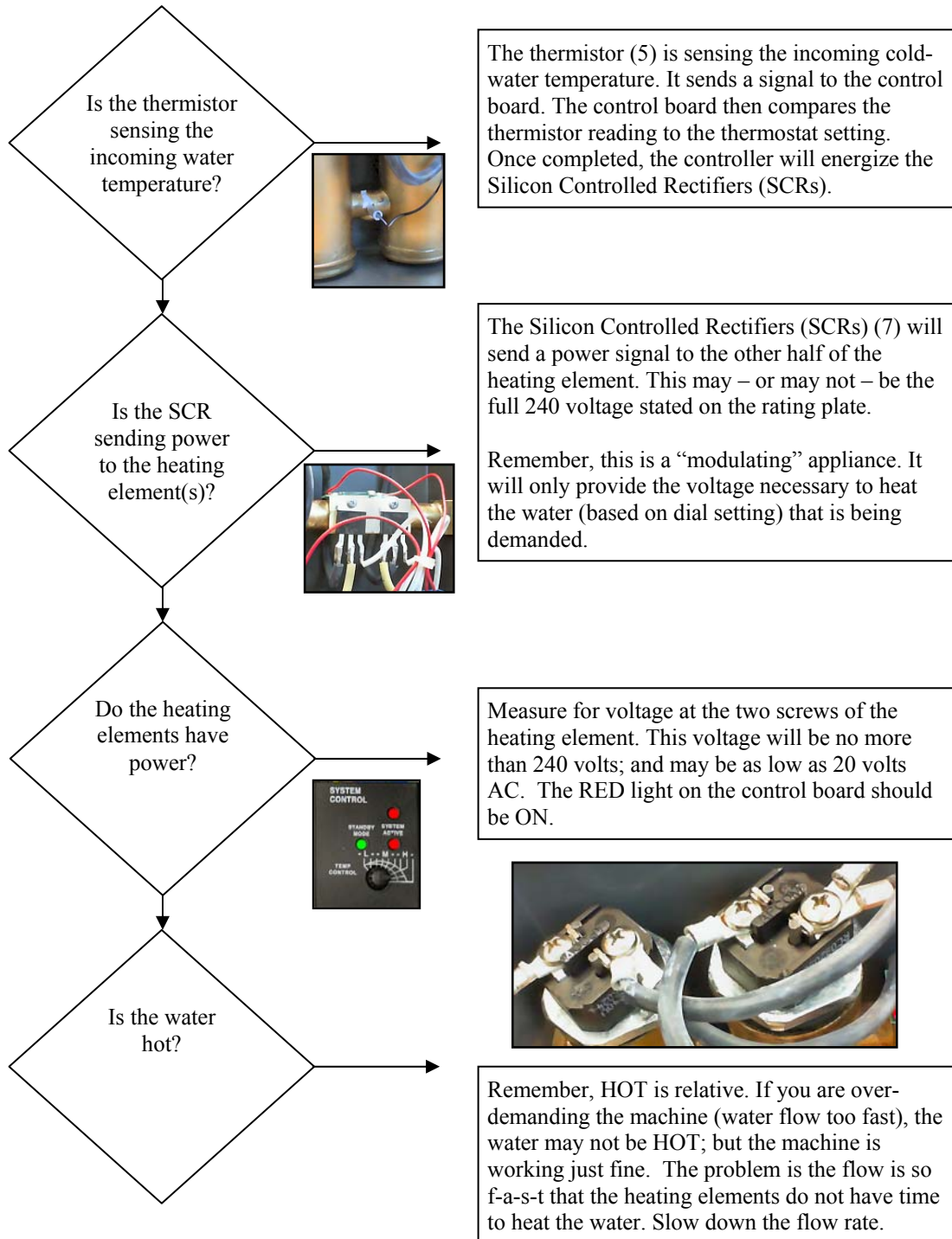
For the balance of this sequence, make sure the temperature is set to HIGH.



A small magnetic plunger (3) moves inside the cold inlet tube. When there is enough flow rate (0.5 GPM) to overcome the spring tension, the magnet is center below the flow switch (4) and makes the contacts close. Measure continuity thru the flow switch.



**Tankless Electric (RTE) Troubleshooting**



***Do to the nature of the tankless electric water heater, troubleshooting will be limited to:***

- ***Does the unit have primary power from the breaker?***
- ***Is the ECO tripped?***
- ***Are the elements getting power ?***
- ***Do the heating elements OHM out correctly?***

Technical Competence, Product Confidence



**Tankless Electric (RTE) Troubleshooting**

Customer calls in reporting no hot water or not enough hot water or water not hot enough from their tankless electric water heater. A unit that ***is functioning correctly*** will follow these steps...

1. A sufficient flow of water through the heater will compress the plunger assembly (3) in the cold water inlet and activate the water flow relay (4).
2. Using a thermistor (5), the control board (6) will determine the water temperature inside the tube (or tubes) and apply voltage to the element(s)(8). This voltage will vary depending on the temperature of the inlet water and the set point of the control knob.
3. The power already flowing through the ECO(s) (2) will meet up with the power thru the SCR(s) (7) into the element at the screw terminals. At this point, the element(s) will heat the water.

**First questions to ask:**

Question	Correct Response	Resolution
Is the green “standby mode” light lit?	Yes	Check breaker
Is the breaker/fuse tripped?	No	Check breaker
What is the “temp control” knob set to?	MAX	Turn indicator knob to MAX
Does the red “system active” light come on when the hot water is demanded?	Yes	Turn on hot water faucet
Is water hot?	Yes	Reduce water flow
How many fixtures is the water heater connected to?	<i>Remember that too much water going through the water heater is the same as No Hot Water. The water flow needs time to heat up inside the metal tubes with the heating elements. Slow down the water flow to see if the water temperature increases.</i>	

**Primary troubleshooting steps common to all tankless electric products:**

1. Turn off the power to the water heater.
2. Removed the front cover from the unit.
3. Turn the control knob on the front of the water heater to “MAX.”
4. Turn on the power to the water heater.
5. Is the GREEN Power light ON?
  - a. If not, measure for 120V (RTE3 only) or 240 V at the field wiring block.
  - b. If no power at field wiring block, check breaker.
6. Turn on a water fixture connected to the water heater.
7. Is the RED System Active light ON?
  - a. If not, increase the water flow to @ .5 gpm or until the red light comes on.
8. **Testing options are going to vary slightly depend on the “tube” count.**
  - a. For single chamber units (RTE3) go to paragraph 1T.
  - b. For two chamber units (RTE7) go to paragraph 2T.
  - c. For three chamber units (RTE13) go to paragraph 3T.
  - d. For four chamber units (RTE18 & 27) go to paragraph 4T.
9. Conduct OHMS resistance check of each heating element. See chart on page 8.



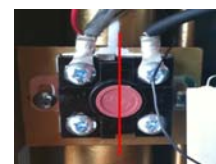
### Tankless Electric (RTE) Troubleshooting

#### 1T - single chamber units (RTE3 & RTE7)



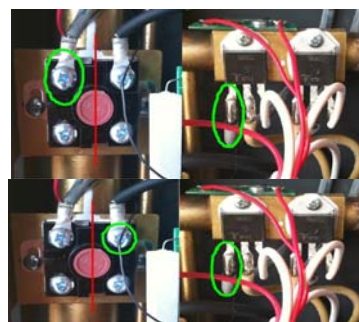
Check the voltage from screw head to screw head on the heating element. This test is the same as the test for a standard residential electric water heater, but be extra careful due to the vertical nature of the heating element. With the control knob set to “max” and with sufficient water flow, you should get the rated voltage for the water heater. If you have voltage, (For example, 200v on a 240v rated water heater) but no hot water, try increasing and decreasing the water flow through the water heater. Does the voltage go up and down with the water flow? As you adjust the water flow, does this affect the water temperature?

With the control knob set to “max” and sufficient water flow, if you have no voltage across your element press the ECO reset button. Was there an audible snap? If so, give the heater a moment then check your fixture for hot water. If there is still no hot water, check for voltage between the screw heads on the element again.



Please note that the ECO on single “tube” models is installed sideways compared to a standard electric water heater. The red line indicates where the electrical “break” occurs when the ECO is tripped.

Unlike the tank style heater, only one hot leg goes through the ECO on the tankless. When you test a tankless ECO, place your left hand probe on the upper left hand screw on the ECO and the right hand probe against the grey (or black) wire on the bottom of the left hand SCR.



Unlike a standard electric, the voltage across the ECO can vary. (This is why you should have the control knob turned to max and have the fixture(s) opened fully.) Are you reading voltage?

If you have no voltage post ECO, move your left hand probe to the right hand screw on the ECO. Leave your right hand probe on the grey (or black) wire on the left hand SCR. Voltage at this point indicates a tripped or defective ECO.

A lack of voltage before the ECO, we will want to test the field wiring block. Place your left hand probe on one of the two screws connected to the black wire and place your right hand probe on one of the two screws holding the white wire. A lack of voltage here is an indication of a tripped breaker/fuse or a bad electrical connection. Since we should have already checked the breaker/fuse, recommend they have the wiring checked by a local electrician.





Tankless Electric (RTE) Troubleshooting

2T - two chamber units (RTE9 & RTE 13)

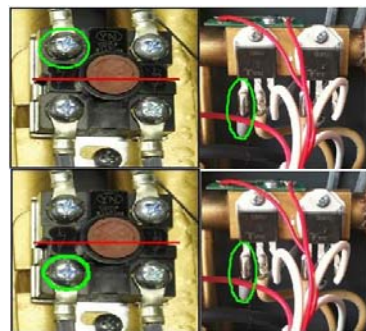


Check the voltage from screw head to screw head on each heating element. With the control knob set to “max” and with sufficient water flow, you should get the rated voltage for the water heater ( $\pm 10\%$ ). If you have voltage, (For example, 200v on a 240v rated water heater) but no hot water, try increasing and decreasing the water flow through the water heater. Does the voltage go up and down with the water flow? As you adjust the water flow, does this affect the water temperature?

With the control knob set to “max” and sufficient water flow, if you have no voltage press the ECO reset button.

Was there an audible snap? If so, check your water temperature. Is the water getting hot? If not, check for voltage between the screw heads on the element again. Still no voltage?

Please note that the ECO on dual “tube” models in installed vertically similar to a standard electric water heater. (This is different than the single “tube” models). Unlike a standard electric water heater, you will only have one ECO for both elements. Also unlike a standard electric heater, you will not test across the ECO. The red line indicates where the electrical “break” occurs when the ECO is tripped. When you test a tankless ECO, place your left hand probe on the upper left hand screw on the ECO and the right hand probe against the grey (or black) wire on the bottom of the left hand SCR.



Unlike a standard electric, the voltage across the ECO can vary. (This is why you should have the control knob turned to max and have the fixture(s) opened fully.) Are you reading voltage? If you have no voltage after ECO, move your left hand probe to the lower left hand screw on the ECO. Leave your right hand probe on the grey (or black) wire on the left hand SCR. Voltage at this point indicates a tripped or defective ECO.

A lack of voltage before the ECO, we will want to test the wiring block. Found at the lower right hand side of the water heater. Place your left hand probe on one of the two screws connected to the black wire and place your right hand probe on one of the two screws holding the white wire. A lack of voltage here is an indication of a tripped breaker/fuse or a bad electrical connection. Since we should have already checked the breaker/fuse, recommend they have the wiring checked by a local electrician.





Tankless Electric (RTE) Troubleshooting

3T - three chamber units (RTE18)

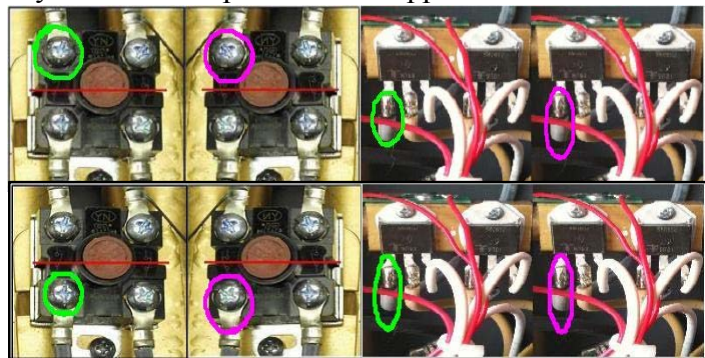


Check the voltage from screw head to screw head on each heating element. With the control knob set to “max” and with sufficient water flow, you should get the rated voltage for the water heater ( $\pm 10\%$ ).

With the control knob set to “max” and sufficient water flow, if you have no voltage press both ECO reset buttons. Was there an audible snap on either ECO? If so, check your water temperature.

You will have two ECOs for three elements. The red line indicates where the electrical “break” occurs when the ECO is tripped. When you test the left hand ECO, place your left hand probe on the upper left hand screw on

the left hand ECO and the right hand probe against the grey (or black) wire on the bottom of the left hand SCR. To test the right hand ECO, place your left hand probe on the upper left hand screw on the right hand ECO and the right hand probe against the grey (or black) wire on the bottom of the middle right hand SCR. Are you reading voltage?



If you have no voltage post ECO, move your left hand probe to the lower left hand screw on the left hand ECO. Place your right hand probe on the grey (or black) wire on the left hand SCR. Voltage at this point indicates a tripped or defective ECO. To test the right hand ECO, place your left hand probe on the lower left hand screw on the right hand ECO and the right hand probe against the grey (or black) wire on the bottom of the middle right hand SCR. (See the pink circles in figure below). Are you reading voltage?

With a lack of voltage before the ECO, we will want to test the wiring blocks. (Found at the lower right hand side of the water heater. ***Please note that there are two wiring blocks on this water heater.***



Starting with the left hand wiring block, place your left hand probe on one of the two screws connected to the black wire and place your right hand probe on one of the two screws holding the white wire. Repeat with the right hand wiring block. A lack of voltage on either wiring block is an indication of a tripped breaker/fuse or a bad electrical connection. Since we should have already checked the breaker/fuse, recommend they have the wiring checked by a local electrician.



Tankless Electric (RTE) Troubleshooting

4T - four chamber units (RTE27)



Check the voltage from screw head to screw head on each heating element. With the control knob set to “max” and with sufficient water flow, you should get the rated voltage for the water heater. If you have voltage, but no hot water, try increasing and decreasing the water flow through the water heater.

With the control knob set to “max” and sufficient water flow, if you have no voltage press the ECO reset button. Was there an audible snap? If so, check your water temperature. Is the water getting hot? If not, check for voltage between the screw heads on the element again.

You will only have two ECOs for four elements. The red line indicates where the electrical “break” occurs when the ECO is tripped. When you test the left hand ECO, place your left hand probe on the upper left hand screw on the left hand ECO and the right hand probe against the grey (or black) wire on the bottom of the left hand SCR. To test the right hand ECO, place you left hand probe on the upper left hand screw on the right hand ECO and the right hand probe against the grey (or black) wire on the bottom of the middle right hand SCR. Are you reading voltage?



If you have no voltage after ECO, move your left hand probe to the lower left hand screw on the left hand ECO. Place your right hand probe on the grey (or black) wire on the left hand SCR. Voltage at this point indicates a tripped or defective ECO. To test the right hand ECO, place you left hand probe on the lower left hand screw on the right hand ECO and the right hand probe against the grey (or black) wire on the bottom of the middle right hand SCR. Are you reading voltage?



If you have a lack of voltage before the ECO, we will want to test the wiring blocks. (Found at the lower right hand side of the water heater. ***Please note that there are two wiring blocks on this water heater.***

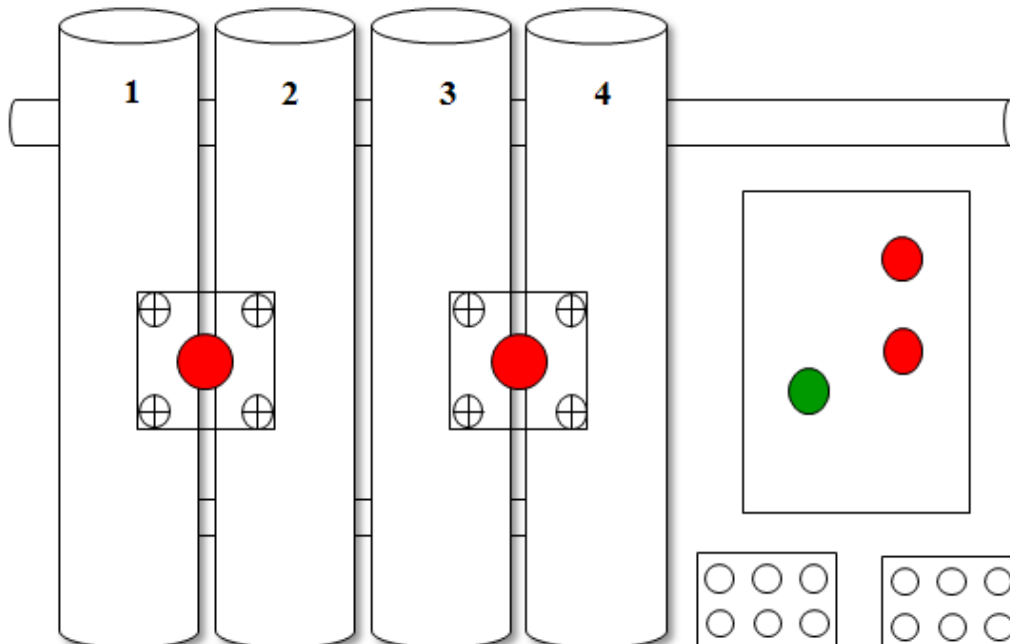


Starting with the left hand wiring block, place your left hand probe on one of the two screws connected to the black wire and place your right hand probe on one of the two screws holding the white wire. Repeat with the right hand wiring block. A lack of voltage on either wiring block is an indication of a tripped breaker/fuse or a bad electrical connection. Since we should have already checked the breaker/fuse, recommend they have the wiring checked by a local electrician.



Tankless Electric (RTE) Troubleshooting

KW		Chamber 1	Chamber 2	Chamber 3	Chamber 4
RTE3	1 Chamber	3KW 120V	N/A	N/A	N/A
	Ohms	4.8 Ω			
RTE 7	1 Chamber	5.5KW 208V	N/A	N/A	N/A
	Ohms	7.9 Ω			
RTE 9	2 Chamber	5KW 240V	5KW 240V	N/A	N/A
	Ohms	11.5 Ω	11.5 Ω		
RTE 13	2 Chamber	5KW 208V	5KW 208V	N/A	N/A
	Ohms	8.7 Ω	8.7 Ω		
RTE 18	3 Chamber	5KW 240V	5KW 240V	5.5KW 208V	N/A
	Ohms	11.5 Ω	11.5 Ω	7.9 Ω	
RTE 27	4 Chamber	5KW 208V	5.5KW 208V	5KW 208V	5.5KW 208V
	Ohms	8.7 Ω	7.9 Ω	8.7 Ω	7.9 Ω







**Tankless Electric (RTE) Troubleshooting**

<i>Symptom</i>	<i>Probable Problem</i>	<i>Corrective Action</i>
Green "Stand by" light is not on.	Power is not getting to the unit	Check breaker connection.  Check voltage on breaker to make sure breaker is good.  Check disconnect box to see if it is on.  On the RTE-18 and RTE-27, make sure the units are connected to two separate breakers.
Green "Stand By" light is on but when I open the faucet, I get no hot water. The red "System Active" lights do not come on	Water lines on the unit are reversed	Check to make sure water is entering the side marked "COLD"
The unit turns on but the breaker trips after a few moments	The wrong size breaker and/or wire is being used with the unit	Have a qualified electrician verify wire size and breaker for your model.
Red and green lights work but no hot water	Heating elements may be opened	Check continuity of heating elements. If elements are good, the problem may be in the electronics.
Water is only warm	Too much water flow going through the unit  Low voltage to unit	Reduce water flow or install water saver devices in fixtures.  Also, reference temperature rise chart on box.  Check supply voltage coming into the unit.
Lights on the unit remain on after water is turned off.	Flow switch might be jammed due to non-flushing of line on initial installation  There could be an open faucet somewhere else or there could be a hot water line leaking in the house	Remove water inlet and screen. Clean inlet tube of debris.  Verify all taps are off and check water meter for signs of flow.