

# How-to-troubleshoot-electric-water-heater

Following information is for homeowner skilled working with electricity who can strenuously avoid electrocution. If you are not familiar with electricity, please open troubleshoot link at bottom of this page and follow EZ repair steps where electricity is turned OFF. Or call plumber or electrician.

-More detailed information available at troubleshoot link below

-Move 240Volt wires to another same-size circuit breaker to eliminate-or-include circuit breaker as potential problem. For example move wires to 30 amp breaker used for clothes dryer.

-Check that wire size matches watt load of water heater. Use copper wire only.

30 amp breaker => 10 gauge wire is best.

20 amp breaker => 12 gauge wire is okay for 3800 watt element, but is lightweight for wattage above 3800 and not as efficient and can shorten life of breaker and main panel busbar.

-Feel breaker if it is warm. Feel wire to see if it is warm. Warm wire and breaker indicate overload.

-When power is ON, elements should test 120Volt to ground at all times since thermostat only turns off one hot leg in the 240Volt circuit. (Some upper thermostats are wired so lower element is not hot at all times, and instead lower thermostat is hot). While wires are attached to elements, and power is ON, test each screw on element to bare metal part of tank.

-Remove wires off elements. Use multimeter set to ohms. Test across both screws for correct ohms. Volts squared divided by element wattage equal correct ohm reading. Element wattage is printed on end of each element.

-Next, while wires are off element, use multimeter set to ohms to test each screw on element to bare metal part of tank. If element is shorted to ground it can cause overheating and trip ECO or trip breaker. This test should show no ohms, or element is bad.

-Then replace both thermostats to start fresh. Take photo of wiring before removing thermostats so wiring is easy to put back. Set upper thermostat to max temperature, and set lower thermostat to minimum temperature. Upper element should activate. Listen for upper element. Test across both screws on upper element for 240V. Test across both screws on lower element to make sure they read 0 volts. Both elements should not be ON at same time in typical residential 240Volt water heater unless heater has been rewired for other purpose or special order from manufacturer. Tank label might give information.

-Next, reverse thermostat settings: Set lower thermostat to max, and upper thermostat to minimum. - Assuming water in upper part of tank is heated above 90 degrees, the lower element should activate. Listen for lower element. Test for 240 across both screws on lower element. Test across both screws on upper element to make sure they read 0 volts.

-If you have new thermostats wired correctly, both elements will not be ON at same time in typical residential 240V water heater. Check label on side of tank for 'non-simultaneous.'

Special-order tanks, and tanks that have been rewired, can be simultaneous where both elements are ON at same time. This requires 50 amp circuit breaker and 6 ga wire, or two separate circuit breakers.

If both elements are ON, then tank could have been rewired incorrectly & thermostat wiring might be issue that is causing water heater ECO to trip due to overheating, or causing circuit breaker to overheat & trip.

<http://waterheatertimer.org/How-to-troubleshoot-electric-water-heater.html>

<http://waterheatertimer.org/How-to-wire-water-heater-thermostats.html>

<http://waterheatertimer.org/9-ways-to-save-with-water-heater.html>

<http://waterheatertimer.org/How-to-install-a-subpanel.html>

<http://waterheatertimer.org/How-to-wire-off-peak-water-heater.html>

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Safety first. Never assume power is OFF.