

Low kW Electric Tankless Water Heater Troubleshooting Guide

Models: AE3.4, AE7.2, AE9.5, RP1P, RP2P, RP3P, RP7P, RP9P, US3, US6, US7, US9



BOSCH



DANGER: ELECTRIC SHOCK

- ▶ ELECTRICITY IS EXTREMELY DANGEROUS. TAKE EXTRA PRECAUTIONS AND DISCONNECT THIS PRODUCT FROM THE ELECTRICAL SUPPLY BEFORE CLEANING, SERVICING OR REMOVING THE COVER.
- ▶ BOSCH ELECTRICAL APPLIANCES SHOULD ONLY BE SERVICED BY A TRAINED TECHNICIAN OR LICENSED ELECTRICIAN.

Step 1 – Document installation details

- ▶ Record information in Step 1 of the Building and Install questionnaire on page 5.



DANGER: ELECTRIC SHOCK

- ▶ FOR STEPS 2, 3 AND 4, SHUT OFF THE CIRCUIT BREAKER POWERING THE APPLIANCE, LOCK IT, AND VERIFY THAT THERE IS NO VOLTAGE AT THE UNIT.



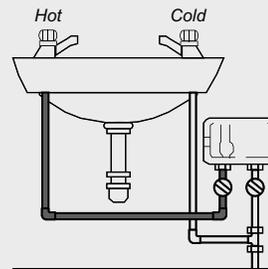
Bosch technical support is available at 866-330-2729. Please document results from each troubleshooting step prior to calling. Without this information documented, we cannot make a determination as to what is wrong with your water heater. This will delay a resolution.

Step 2 – Water supply and water heater settings

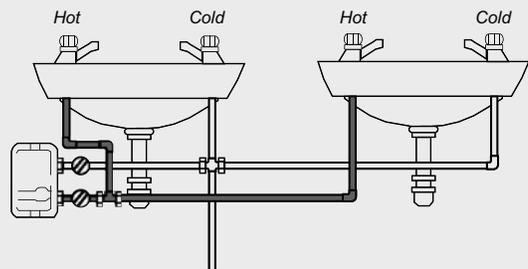
- ▶ Verify the heater is installed in one of the two positions shown in Fig. 1.

Figure 1

Installation #1 (front view)



Installation #2 (front view)



Introduction

Who should perform the troubleshooting?

Anyone who has the qualifications to work safely with 240VAC. If you do not possess the tools or the knowledge to work safely with 240VAC, contact a licensed professional.

What does this troubleshooting guide cover?

This guide covers every test we can advise you to perform on the location, installation, and water heater. With ALL the information from ALL the tests in this guide, it is possible to diagnose any water heater of this type to a point where we can advise a repair or cover warranty.

Required tools:

- ▶ Adjustable wrench
- ▶ Empty gallon container
- ▶ Digital multi-meter
- ▶ Phillips head screwdriver
- ▶ Flat head screwdriver

- ▶ Make sure the heater is not being supplied by preheated or recirculated water.
- ▶ Verify that the cold water supply is connected to the INLET (marked in blue).
- ▶ Remove heater cover and check power setting by making sure that the Power Selection Screw (see Fig. 2) is set all the way to HI or LO and screwed down tight.

Figure 2



i **NOTICE:**
If the Power Selector Screw is set to LO, only one of the two heating elements will operate and the output will be reduced by 50%.

- ▶ Verify flow rate
 1. Using a measured container (a ½ or 1 gallon container works well), time how long it takes to fill it with water from a hot water only faucet or shower. Calculate the flow rate by taking the size of the container and dividing it by the time it took then multiplying the answer by 60. This will yield a gpm result.

Example:

$$\frac{\text{Water collected (gallons)}}{\text{Time to fill (seconds)}} \times 60 = \text{gallons per minute}$$

See Table 1 below for required flow rates

2. Document your findings in the Building and Installation questionnaire, page 5.
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- ▶ Checking for plumbing crossovers:
 1. Shut water supply off to the water heater using the contractor provided isolation valves, isolating the hot water side of the system.

i Do not turn off the water supply to the whole house; only to the water heater. If you do not have an isolation valve on the water heater, you cannot perform this test.

2. Open ALL hot water taps connected to the water heater and set all fixtures to hot only.
3. Allow some time (approx. 5 minutes) for water to stop running and pipes to drain. If pipes are drained you should be able to place a hand over end of faucet and feel no pressure.

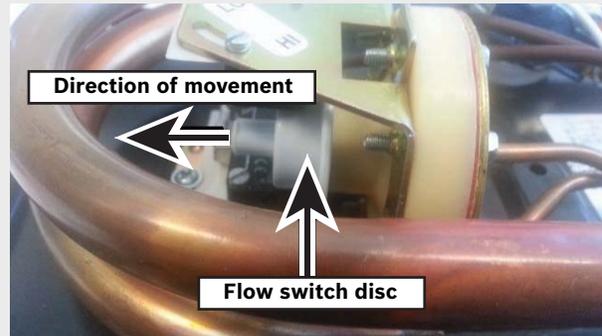
Expected Rise in Water Temperature						Table 1					
Model	Volts	Amps	Element Resistance	High Setting (kW)	Low Setting (kW)	Temperature Rise (°F) at Flow Rate (GPM)					
						0.5 GPM	0.75 GPM	1.0 GPM	1.5 GPM	2.0 GPM	2.5 GPM
US3, AE3.4, RP3P	120	27	2 x 8 Ω	3.4 - 3.0	—	41 °F	28 °F	20 °F	N/A	N/A	N/A
RP2P	277	11	1 x 25 Ω	—	3.0	41 °F	28 °F	21 °F	14 °F	N/A	N/A
RP2P	277	22	2 x 25 Ω	6.0	—	81 °F	55 °F	42 °F	27 °F	N/A	N/A
US7, AE7.2, RP7P	240	15	1 x 16 Ω	—	3.6 - 3.05	N/A	32 °F	24 °F	16 °F	12 °F	N/A
US7, AE7.2, RP7P	240	30	2 x 16 Ω	7.2 - 6.1	—	N/A	63 °F	48 °F	32 °F	24 °F	N/A
US9, AE9.5, RP1P	208	18	1 x 12 Ω	—	3.5	N/A	32 °F	24 °F	16 °F	12 °F	N/A
US9, AE9.5, RP1P	208	35	2 x 12 Ω	7.1	—	N/A	64 °F	48 °F	32 °F	24 °F	N/A
US9, AE9.5, RP1P	240	20	1 x 12 Ω	—	4.75	N/A	42 °F	32 °F	21 °F	16 °F	N/A
US9, AE9.5, RP1P	240	40	2 x 12 Ω	9.75	—	N/A	84 °F	64 °F	42 °F	32 °F	N/A
RP9P	277	17.5	2 x 15.8 Ω	—	4.75	N/A	42 °F	32 °F	21 °F	16 °F	N/A
RP9P	277	35	1 x 15.8 Ω	9.75	—	N/A	84 °F	64 °F	42 °F	32 °F	N/A

4. If any water continues to flow, you have found a crossover and one of the following conditions could exist and must be corrected:
 - The most likely cause of this condition is that a mixing valve has an internal leak allowing cold water to mix with the hot. While this may not be causing the symptoms at your water heater, it may affect the ability of the water heater to reach temperature and can cause activation issues along with temperature fluctuations.
 - While unlikely, a cold water pipe could be connected to a hot water pipe. If you have had some plumbing work done recently and the symptoms coincide with the work done, you may want to contact the person that did the work.
5. Close all fixtures and reopen water supply to the water heater.
6. Document your findings in the Building and Installation questionnaire, page 5.

Step 3 – Physical inspection

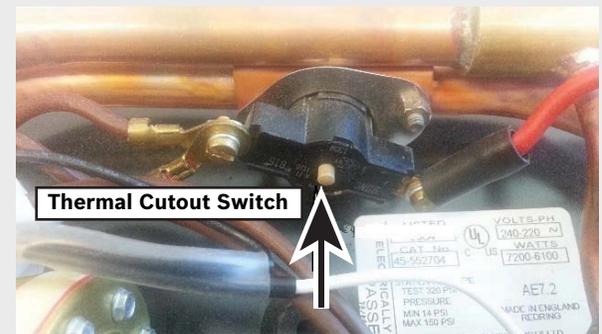
- ▶ Visual Inspection
 1. Thoroughly inspect the water heater's internal components. Note the following:
 - Any signs of melted or damaged wires
 - Alignment of components
 - Screw tightness
 - Any signs of water leakage
 2. Document your findings in the Water Heater questionnaire, page 5.
- ▶ Check the Flow Switch:
 1. Begin with no water running through the unit. Ensure power is still off.
 2. Open a faucet to allow maximum water to flow through the unit.
 3. If possible, use isolation valve on cold supply to close, then open water supply to the unit. This will allow you to open and close water flow while being in front of the heater to observe. If an isolation valve is not installed, a second person will be needed to open and close the faucet, while another person is at the heater to observe the flow switch.
 4. Close, then open water flow through the unit. While doing this, observe whether or not the flow switch activates. When adequate water flows through the unit the water pressure will push the flow switch disc against microswitches (see Fig. 3). You should see that movement and also hear a click.

Figure 3



- ▶ Check the Thermal Cut Out:
 1. Locate the thermal cut out switch (see Fig. 3).
 2. Press the button located in the center of the cut out switch. If you feel it click (similar to a ball point pen), then the thermal cut out was tripped.

Figure 4

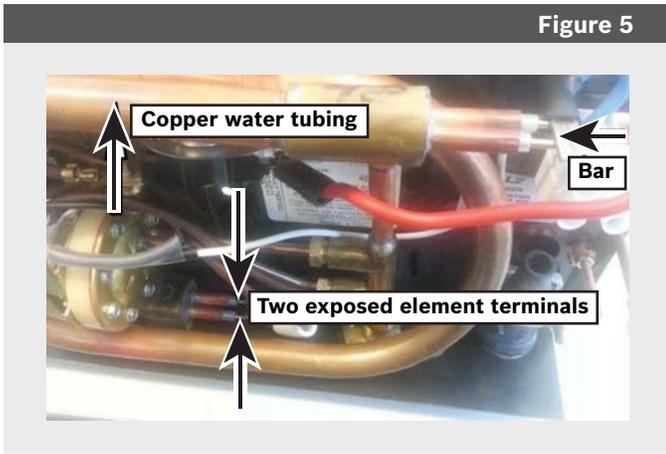


i NOTICE:
The thermal cut out trips because of another underlying problem, such as scale, low flow with warm inlet water, high temperature setting or preheated water. It is important to find the issue before returning the heater to service.

3. Document your findings in the Water Heater questionnaire, page 6.

Step 4 – Checking continuity and resistance

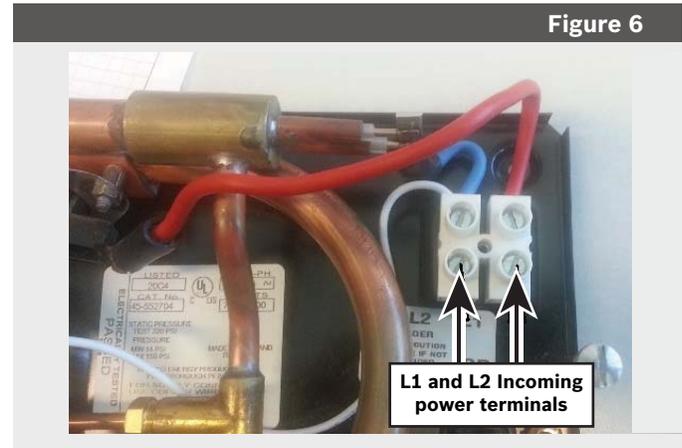
- ▶ Check the resistance of the elements (see Fig. 5) to be sure they meet the requirements as listed in Table 1 of this document.



1. Ensure power supply to the unit is off.
2. Set your multimeter to Mohms (2000K, 2M or 20M).
3. Place one multimeter probe on the common steel bar that joins the two element terminals together and touch the other probe to the copper water tubing to see if you have any continuity there.
4. Document your findings in the Water Heater questionnaire, page 6.
5. Set multimeter to 100 ohms scale. While keeping one probe on the bar, use the other probe to touch each of the two exposed element terminals in turn and write down resistance readings of each.
6. Document your findings in the Water Heater questionnaire, page 6.

Step 5 – Verify the power supply

- ▶ Turn on circuit breaker supplying appliance and check the power supply using an appropriate scale.
 1. Measure the incoming voltage across L1 and L2 terminals (see Fig. 6) to be sure the unit is receiving the correct voltage for the particular model# according to Table 1 on page 2 of this document.



2. Record your results in the Water Heater questionnaire, page 6.

Questionnaires

Building and Installation:	
STEP 1: Bosch Customer # (if known)	
Owner's Name?	
Owner's address?	
Owner's phone number?	
Model and serial number?	Model: _____ Serial Number: _____
Where did you purchase this water heater?	
Name of installer and phone number?	Installer: _____ Phone: _____
Date of installation?	Date of Installation: ___/___/___
Where in the building is this water heater installed?	
Water supply and water pressure?	<input type="checkbox"/> Municipal <input type="checkbox"/> Well <input type="checkbox"/> Other: _____ Water pressure: _____ PSI
What is the water supply material to and from the heater?	<input type="checkbox"/> Copper <input type="checkbox"/> Plastic <input type="checkbox"/> Stainless <input type="checkbox"/> Other: _____ Flex If plastic, does plastic piping connect directly to unit? <input type="checkbox"/> Yes <input type="checkbox"/> No
When facing water heater, which side of the water heater does the cold water pipe connect to?	<input type="checkbox"/> Left <input type="checkbox"/> Right <input type="checkbox"/> Top <input type="checkbox"/> Bottom
Circuit breaker size and type	<input type="checkbox"/> Single pole <input type="checkbox"/> Double pole Amperage: _____
What is the gauge of the wiring supplied to the unit?	_____ AWG
STEP 2: Temperature Power Selector Screw setting:	<input type="checkbox"/> Low <input type="checkbox"/> High
Fixture(s) used for troubleshooting this water heater?	<input type="checkbox"/> Sink <input type="checkbox"/> Shower <input type="checkbox"/> Tub <input type="checkbox"/> All Fixtures
Flow rate of fixture(s) used for troubleshooting?	_____ GPM
Plumbing crossover test results - crossover present?	<input type="checkbox"/> Yes <input type="checkbox"/> No

Water Heater:		
STEP 3: Are there any burned or melted wires in the unit?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Are there any signs of water leakage?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Is the thermal cut out tripped?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
If the thermal cut out was tripped, have you reset it?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Does the flow switch operate with water flow?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
STEP 4: Resistance of each element	Element 1: _____ Ω	
	Element 2: _____ Ω	
Is there continuity between the bar and the copper water tubing?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
STEP 5: Voltage Supply:	Voltage across L1 - L2: _____ VAC	



After completing this questionnaire, please have your technician call us while still at the unit at 1-866-330-2729 for diagnosis and resolution or if it is more convenient, please email the completed questionnaire to ldy.asa@us.bosch.com and we will reply within one business day.



BOSCH

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