

# 12 kW Electric Tankless Water Heater Troubleshooting Guide

Models: AE12, RP12T, US12



# 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.



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.

## 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

## Step 1 – Document installation details

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



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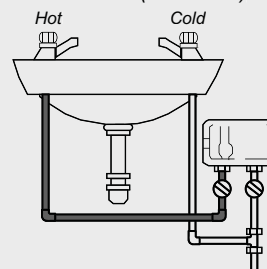
- ▶ FOR STEPS 2, 3 AND 4, SHUT OFF THE CIRCUIT BREAKER POWERING THE APPLIANCE, LOCK IT, AND VERIFY THAT THERE IS NO VOLTAGE AT THE UNIT.

## Step 2 – Water supply and water heater settings

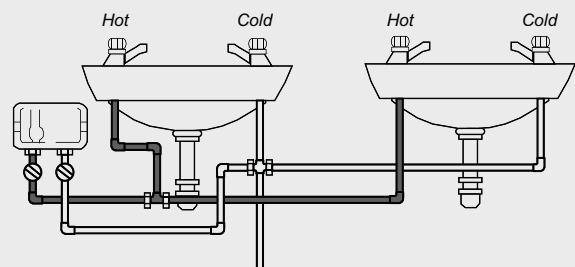
- ▶ Verify the heater is installed in one of the two positions (inlet/outlet connection on bottom) shown in Fig. 1.

Figure 1

Installation #1 (front view)

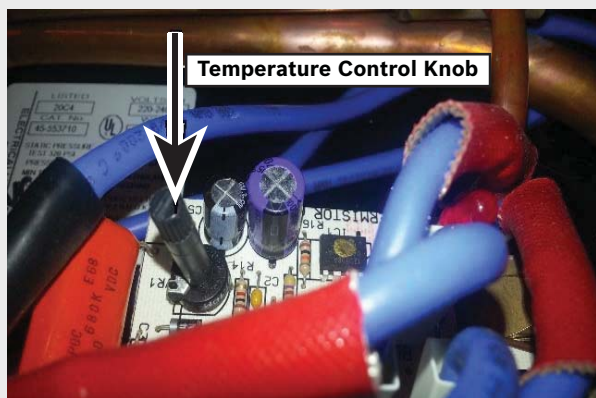


Installation #2 (front view)



- ▶ 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).
- ▶ Check temperature knob setting (see Figure 2 below):
  1. Remove the heater cover.
  2. Make sure the temperature spindle is set all the way clockwise.

Figure 2



3. Document your findings in the Building and Install questionnaire on page 5.

- ▶ Verify flow rate
  1. Using a measured container (a ½ or 1 gallon container works well), time how long it takes to fill it water from the hot side of a faucet connected to the water heater. 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:**

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

**i** Flow rates below 0.6 gpm will not activate the water heater. Flow rates above 2.0 gpm may cause insufficiently warm water.

2. Document your findings in the Building and Installation questionnaire on page 5.

- ▶ Checking for plumbing crossovers:

1. Keep water supply off to the water heater using the contractor provided isolation valves, isolating the hot water side of the system.



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.
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 will certainly affect the ability of the water heater to reach its maximum stated output and can cause activation issues and 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 on page 5.

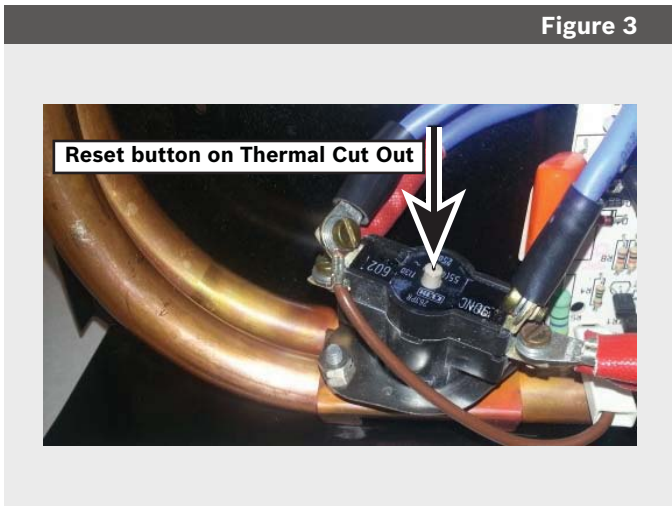
**Step 3 – Physical inspection**

- ▶ Visual Inspection

1. Thoroughly inspect the water heater's internal components. Note the following:
  - Burn or scorch marks on the PCB (Printed Circuit Board)
  - Any signs of melted or damaged wires
  - Cracks in plastic components
  - Alignment of components
  - Screw tightness
2. Document your findings in the Water Heater questionnaire on page 6.

► Checking 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.

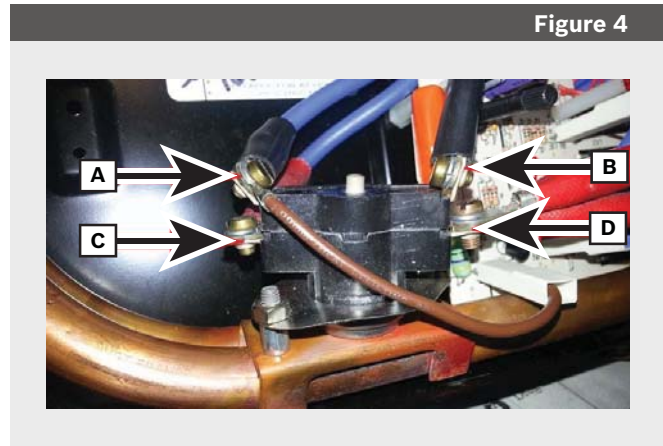


**NOTICE:**  
The thermal cut out trips because of another underlying problem, such as scale, low flow with warm inlet water, high temperature setting or preheated water. It is important to find the issue before returning the heater to service.

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

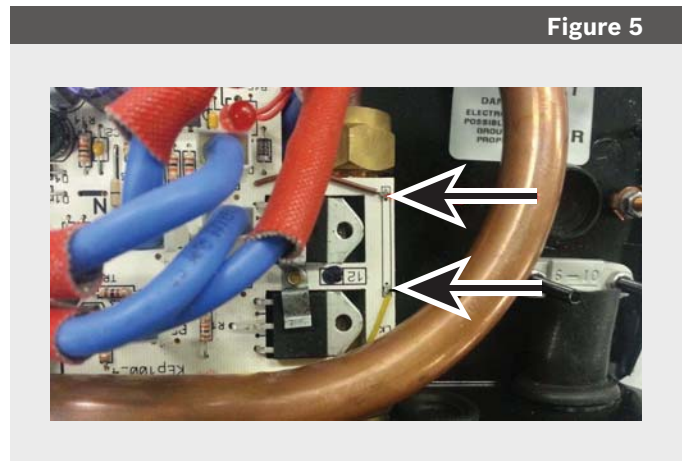
**Step 4 – Checking continuity and resistance**

- Ensure the circuit breaker powering the appliance is still shut off.
- Check the thermal cut out switch for continuity.
  1. Check for continuity between connections labeled A-B and also C-D (see Fig. 4).
  2. Document your findings in the Water Heater questionnaire on page 6.



- Check the flow switch for continuity.

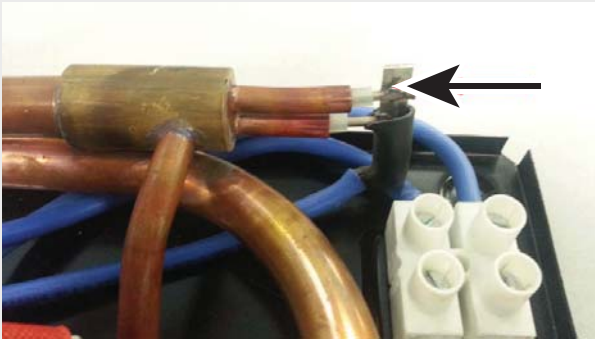
1. With no water flowing through the unit, check continuity between the brown wire and the yellow wire on the circuit board using 100 ohms scale (see Fig. 5). A stuck or damaged flow switch will show a closed circuit without water flow causing the TCO to trip.
2. Now with water flowing through the unit, check continuity between the brown wire and the yellow wire on the circuit board using 100 ohms scale (see Fig. 5).



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

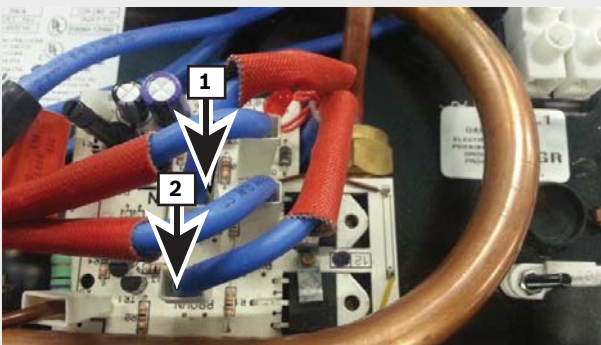
- ▶ Check the resistance of the elements.
  1. Ensure that the power to the unit is turned off.
  2. Set your multimeter to an appropriate setting to be able to test for resistance in the 10 ohms range.
  3. Place the red probe on the steel bar as shown in Figure 6 below and keep it there.

Figure 6



4. Place the black probe down inside the two white plug connectors shown in Figure 7, one after the other, and write down the resistance readings of each. Ensure that you make good contact with the probes to improve the accuracy of your test result.
5. Document your findings in the Water Heater questionnaire, page 6.

Figure 7

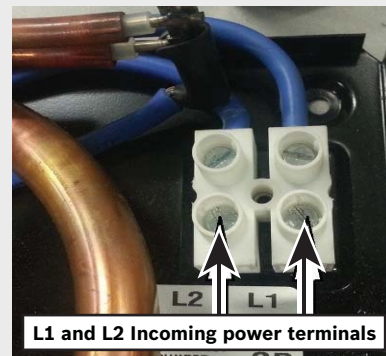


- ▶ Check to see if either element is grounded to the water tubing.
  1. Ensure power supply to the unit is off.
  2. Set your multimeter to Mohms (2000K, 2M, or 20M).
  3. Place one multimeter probe on the common steel bar that joins the two element terminals together (Fig. 6) and touch the other probe to the copper water tubing to see if you have any continuity or resistance there.
  4. Document your findings in the Water Heater questionnaire, page 6.

### Step 5 – Verify the power supply

- ▶ The power will need to be turned on for this test, please use caution. Check the power supply using an appropriate scale.
  1. Measure the incoming voltage across L1 and L2 terminals (see Fig. 8) to be sure the unit is receiving 240 VAC.

Figure 8



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

**Questionnaires**

Building and Installation:	
<b>STEP 1:</b> 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
<b>STEP 2:</b> Temperature Control Knob Setting:	<input type="checkbox"/> Low <input type="checkbox"/> Middle <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:	
<b>STEP 3:</b> 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
Are there any signs of water leakage?	<input type="checkbox"/> Yes <input type="checkbox"/> No
<b>STEP 4:</b> Is there continuity across the flow switch when water is running through the unit	<input type="checkbox"/> Yes <input type="checkbox"/> No
Resistance of each element	Element 1: _____ $\Omega$ Element 2: _____ $\Omega$
Are Either Of The Two Elements Grounded	<input type="checkbox"/> Yes <input type="checkbox"/> No
Thermal Cut Out Continuity:	A-B Terminals: <input type="checkbox"/> Yes <input type="checkbox"/> No C-D Terminals: <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>STEP 5:</b> 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](mailto:ldy.asa@us.bosch.com) and we will reply within one business day.



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