

High kW Electric Tankless Water Heater Troubleshooting Guide

Models: WH17, WH27, WH36 AE115, AE125, (FD108 and higher)



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.



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 local 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
- ▶ Gallon container
- ▶ Digital multi-meter
- ▶ Phillips head screwdriver



For Leaks: Complete Step 1 only and call Bosch Electric Technical Support 1-866-330-2729. You will need a description of the leak, its location and may be asked for digital pictures.

Step 1 – Document installation details

- ▶ Complete the “Building and Install” questionnaire.

Step 2 – Water supply and water heater settings

- ▶ Check temperature knob setting:
 1. Make sure the temperature knob is set all the way clockwise as viewed from the bottom of the water heater.
Tip: The temperature knob setting dictates the output water temperature: try testing the water temperature at several settings.

Figure 1



Bottom of Heater

2. Document your findings in the Building and Installation questionnaire.
- ▶ Verify flow rate
 1. Using a graduated 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:

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

2. Document your findings in the Building and Installation questionnaire.



Flow rates below 0.6 gpm on 17kW/36kW units and 0.8 gpm on 27kW units, will not activate the water heater. Flow rates above 2.5 gpm on 17kW units may cause insufficiently warm water.

- ▶ If flow rates were below 0.6 gpm on 17kW/36kW units and 0.8 gpm on 27kW units, check the inlet water screen:
 1. Shut the water supply off to the water heater and open a hot water faucet to relieve the pressure.
 2. Remove the cold water supply line from the bottom of the water heater.
 3. Remove the inlet water screen from the cold water connection, inspect, and clean it as required.

Figure 2



4. Install the inlet screen and attach the water line in accordance with standard plumbing practices. Take care to not get any pipe sealant inside the unit.
 5. Document your findings in the Building and Installation questionnaire.
- ▶ Checking for plumbing crossovers:
 1. Keep water supply off to the water heater, 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 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 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.

Step 3 – Visual inspection

- ▶ Visual Inspection
 1. Thoroughly inspect the water heater's internal components. Note the following:
 - Burn or scorch marks on the PCB control on the lower right side
 - Burn or scorch marks on the triac boards on top of each module. 27/36kW units have 2 triac boards on each module
 - 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.
- ▶ Check the flow transducer (Fig. 3):
 1. With the water running at least 1 gpm (gallon/minute), make sure the flow transducer is turning.

Tip: Use a flashlight to illuminate the flow transducer and have someone turn the water on and off. Because the flow transducer spins so fast, it is more likely you will see the movement as it first begins to spin and as it stops spinning.
 2. Document your findings in the Water Heater questionnaire.

Figure 3

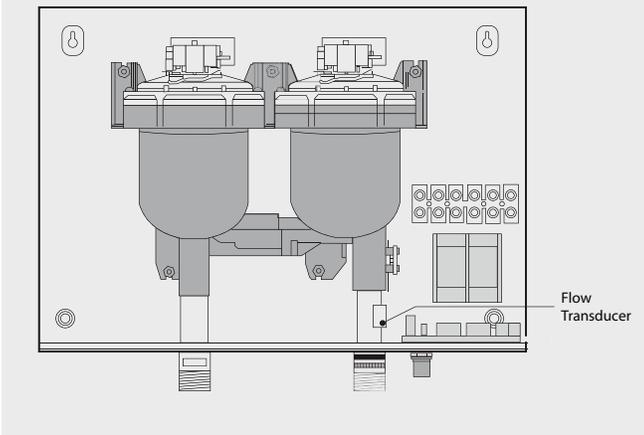
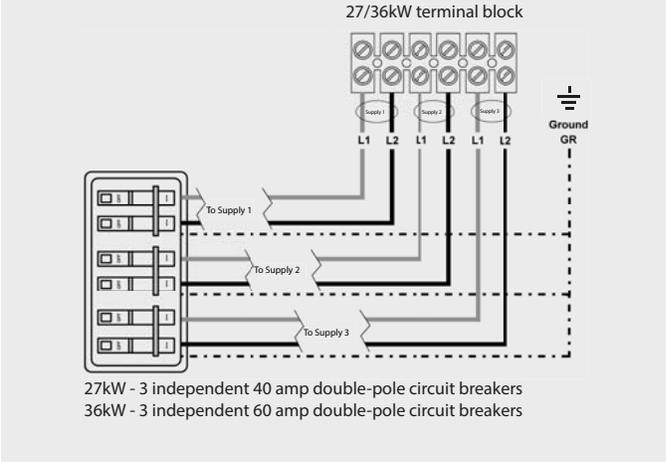


Figure 5

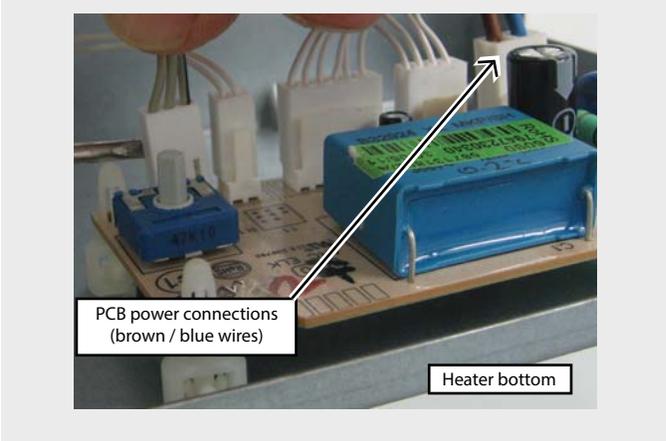


Step 4 – Verify the power supply

- ▶ Check the power supply using an appropriate scale for 240 VAC.
 1. Measure the incoming voltage:
 - WH17 / AE-115 have two readings (Fig. 4)
 - WH27 / WH36 / AE-125 have three readings (Fig. 5)
 2. Check the pairing of the incoming power connections by measuring the voltage of all combinations of L1 to L1 and L2 to L2. Voltage between any of these pairs (L1-L1 or L2-L2), indicates an installation error and must be resolved by an electrician.

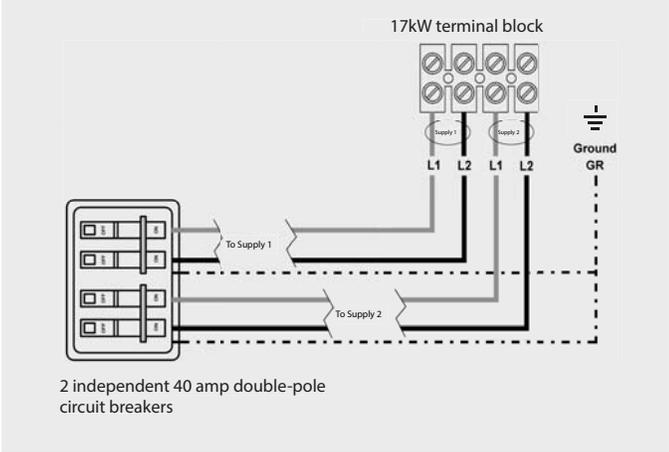
3. Check that voltage is reaching the PCB by measuring the voltage between the blue and brown power connections on the board itself (Fig. 6).

Figure 6



4. Shut off the circuit breakers powering the appliance, lock them, and verify that there is no voltage at the unit.
5. Document your findings in the Water Heater questionnaire.

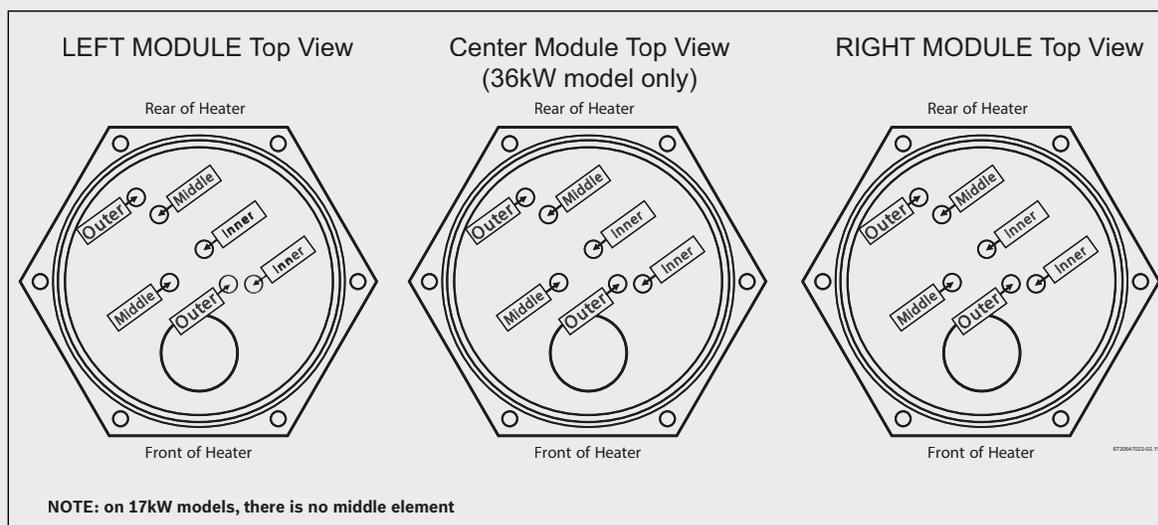
Figure 4



Step 5 – Troubleshoot the element assemblies

- ▶ Verify that circuit breakers are off and there is no voltage at the unit.
- ▶ Measure resistance of element assemblies (Fig. 7):
 - **For 17kW models:**
 1. Using a 200 ohm range on a digital multi-meter, test all the elements on left heating module.
 - Outer to Outer (Brown wire with the black insulation to left side of the TCO)
 - Inner to Inner (Black wire with the black insulation to left side of the TCO)
 2. Using a 200 ohm range on a digital multi-meter, test all the elements on right heating module.
 - Outer to Outer (Brown wire with the black insulation to the bottom left side of the TCO)
 - Inner to Inner (Black wire with the black insulation to the bottom left side of the TCO)
 - Middle to Middle (Gray wire with the black insulation to top left side of the TCO)
 - **36kW model only:**
 1. Using a 200 ohm range on a digital multi-meter, test all the elements on center heating module.
 - Outer to Outer (Brown wire with the black insulation to the bottom left side of the TCO)
 - Inner to Inner (White wire with the black insulation to the bottom left side of the TCO)
 - Middle to Middle (Gray wire with the black insulation to top left side of the TCO)
 - **All Models:**
 1. Using the 20 Mohm (Mega ohm) range on a digital multi-meter, test each element tip to ground.
 2. Record all readings along with where you encountered them.
 3. Using the 200 ohm range on a digital multi-meter, test the resistances across the terminals of the TCOs (Thermal Cut Outs).
- ▶ Record your results in the Water Heater questionnaire.

Figure 6



Questionnaires

Building and Installation:	
STEP 1: 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"/> Munciple <input type="checkbox"/> Well Water pressure: _____PSI
What is the water supply material?	<input type="checkbox"/> Copper <input type="checkbox"/> Plastic 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?	<input type="checkbox"/> Left side <input type="checkbox"/> Right side
Circuit breaker size and quantity	<input type="checkbox"/> Single pole <input type="checkbox"/> Double pole Amperage: _____ Quantity: _____
STEP 2: To what position is the temperature knob set?	<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
Inlet filter screen clean?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Plumbing crossover test results - crossover present?	<input type="checkbox"/> Yes <input type="checkbox"/> No

Water Heater:	
STEP 3: Are there any burn or scorch marks on the PCB?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Are there any cracked or melted wires in the unit?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Were each of the wires into the control PCB secure?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Are the blue and brown wires into the terminal blocks secure?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Are there any damaged plastic components in the unit?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Is the flow transducer spinning?	<input type="checkbox"/> Yes <input type="checkbox"/> No
STEP 4: Feed voltage:	Pair 1 - L1 to L2: _____VAC
	Pair 2 - L1 to L2: _____VAC
	Pair 3 - L1 to L2: _____VAC (27kW only)
Feed voltage polarity:	Pair 1 - L1 to L1: _____VAC L2 to L2: _____VAC
	Pair 2 - L1 to L1: _____VAC L2 to L2: _____VAC
	Pair 3 - L1 to L1: _____VAC L2 to L2: _____VAC (27/36kW only)
Voltage to PCB:	_____VAC

Water Heater continued:

STEP 5: Right hand module element resistance in ohms:	Outer to Outer: ____ Ω	
	Middle to Middle: ____ Ω (27/36kW only)	
	Inner to Inner ____ Ω	
Left hand module element resistance in ohms:	Outer to Outer: ____ Ω	
	Middle to Middle: ____ Ω (27/36kW only)	
	Inner to Inner ____ Ω	
Center module element resistance in ohms (36kW model only):	Outer to Outer: ____ Ω	
	Middle to Middle: ____ Ω	
	Inner to Inner ____ Ω	
Are there any grounded elements? If so, which ones?		<input type="checkbox"/> Yes <input type="checkbox"/> No
Thermal Cut Out readings:	Right hand module	Top terminals ____ Ω Bottom terminals ____ Ω
Thermal Cut Out readings:	Left hand module	Top terminals ____ Ω Bottom terminals ____ Ω
Thermal Cut Out readings:	Center module	Top terminals ____ Ω Bottom terminals ____ Ω
Notes:		



After completing this questionnaire, please have your technician call us while still at the unit at **1-800-798-8161** for diagnosis and resolution. If it is more convenient for you, please email the completed questionnaire to **ldy.asa@us.bosch.com** and we will reply within one business day.

**BOSCH**

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