REPORTED PROBLEM:

The topside panel displays “Sn.”

Topside Panel

Buttons

SYSTEM VOLTAGE:

- 240V

PROBABLE CAUSES:

- Inadequate water flow through the heater.
- Faulty heater sensors.
- Faulty circuit board in the system pack.

TROUBLE SHOOTING STRATEGY:

- The heater has two temperature sensors. In order to determine adequate water flow, each sensor monitors temperature separately. If the difference in temperature between the two sensors is 2 degrees or less, no fault will be displayed and the unit will run normally. If the difference in temperature is greater than 2 degrees, the unit will display Sn and one of three things could be causing a problem. 1) Inadequate water flow through the heater can cause this problem. Make sure the pump is running and all jets are producing an output satisfactory to their design. 2) Faulty temperature sensors. 3) Faulty circuit board in the system pack.
- Confirm proper voltage at the system pack terminal block and ground fault circuit interrupter (GFCI).
- Put the system pack in “test mode” by turning DIP switch number 1 ON. Once the DIP switch is ON, press the “light” button on the topside panel. The panel will display the temperature from sensor A and sensor B.
- If the pump is not running , proceed to pump operational troubleshooting. This is covered in a separate troubleshooting guide.

IMPORTANT TROUBLESHOOTING CONCEPTS:

- Set the volt meter to AC voltage. “AC” stands for alternating current.
- Before connecting or disconnecting any components from the system pack’s circuit board, power OFF the system pack at the GFCI.
- Double check the temperature sensors by using a thermometer to confirm spa water temperature.
- The primary concept of this troubleshooting guide is simple: perform two temperature tests, and compare the results of both tests.

Test one: write down the temperature readings from sensors A and B. Switch the sensors on the system pack circuit board.

Test two: write down the temperature readings from sensors A and B again.

Compare the results of test #1 to test #2. For this example, lets say test #1 has the following results.
Sensor A = 99°
Sensor B = 50°

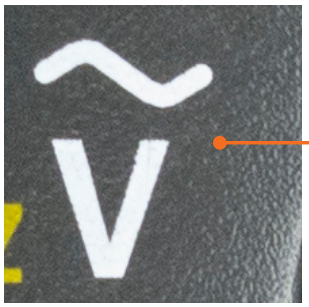
If sensor A = 99° in test #1 and 99° in test #2, the system pack circuit board is faulty. Replace the whole system pack (not just the circuit board in the system pack).

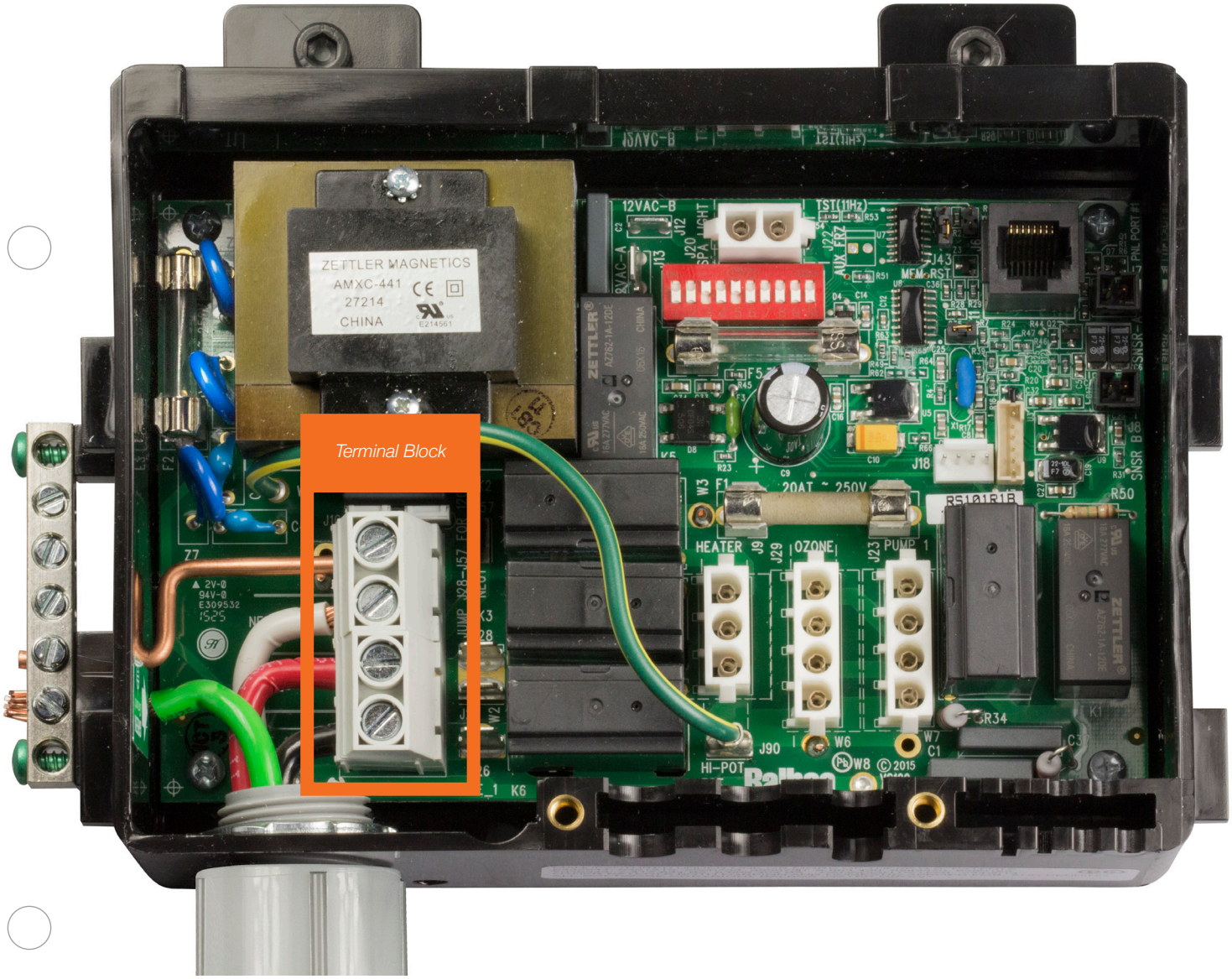
If sensor A = 99° in test #1 and 50° in test #2, the sensors are faulty. Replace sensors A and B (not just one sensor).

STEP 1

Use a voltmeter to verify voltage at the terminal block.

Set the volt meter to AC voltage. “AC” stands for alternating current.





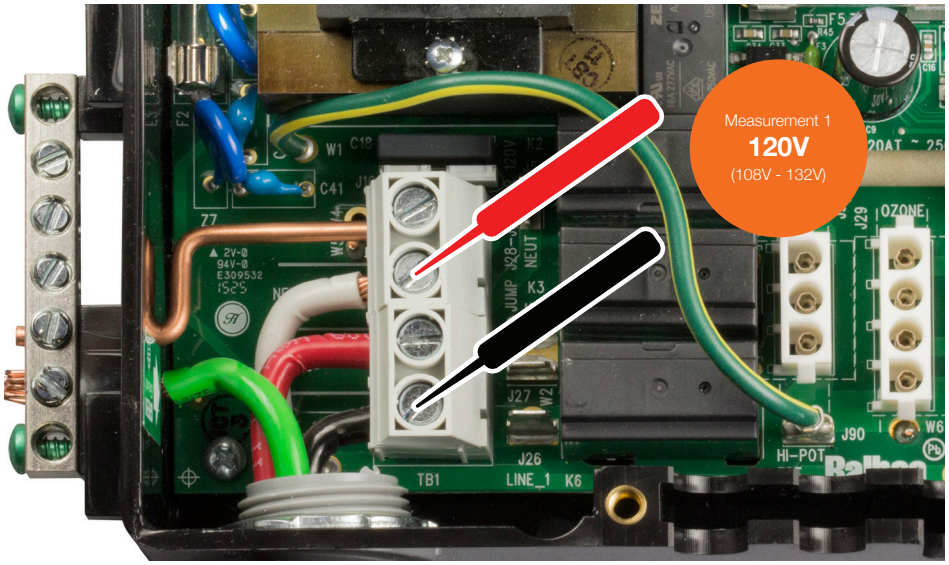
STEP 1

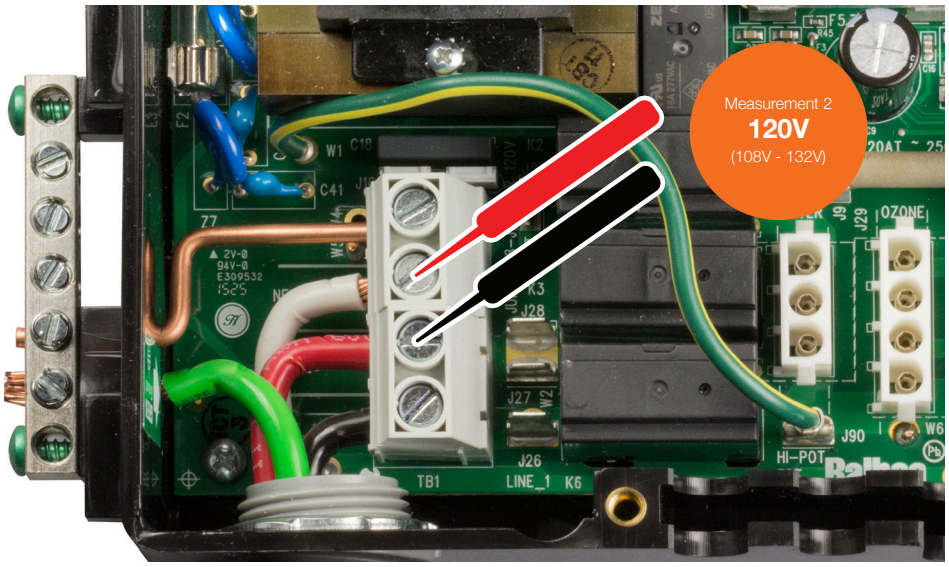
Voltage measurements that vary plus or minus 10% are accurate. For example, if a 240V component is measured between 216V - 264V, the reading is accurate.

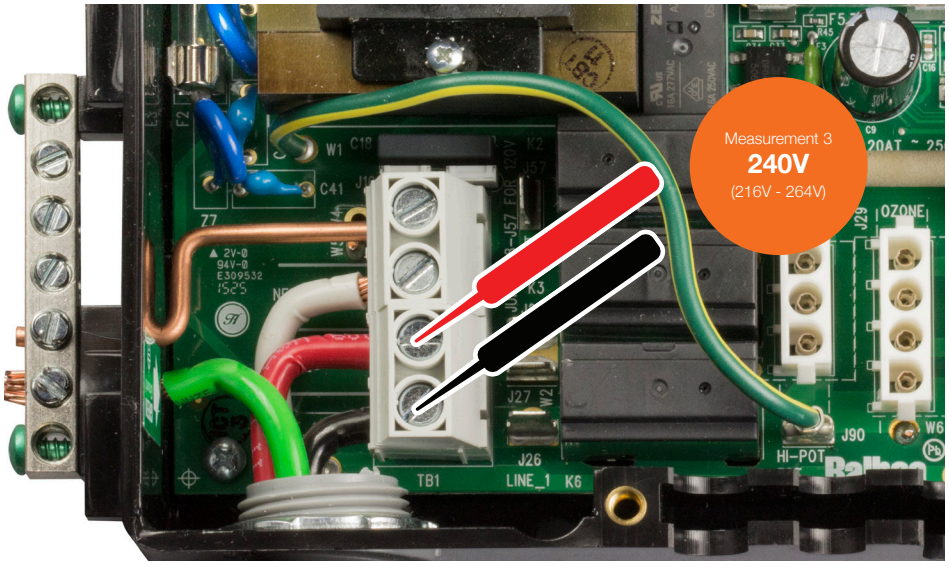
Measurements 1 and 2 should be 120V, and measurement 3 should be 240V.

If measurements 1 - 3 are accurate, go to step 2.

If measurements 1 - 3 are inaccurate, there may be problems with the GFCI or electrical service. Go to step 3.

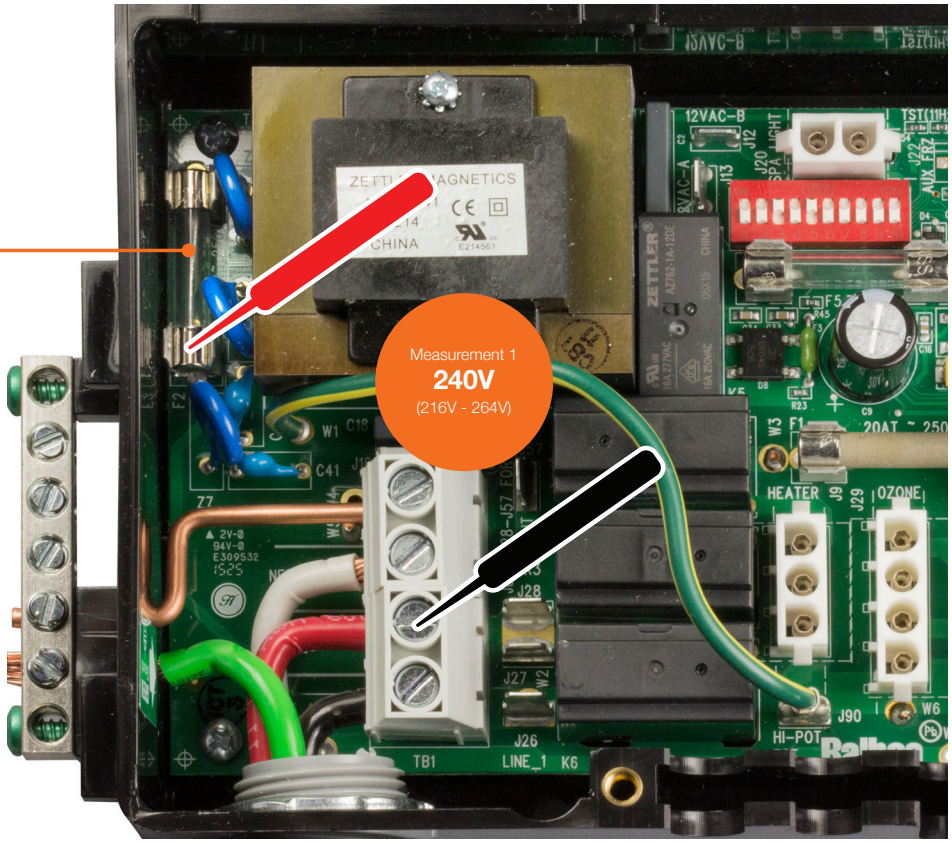






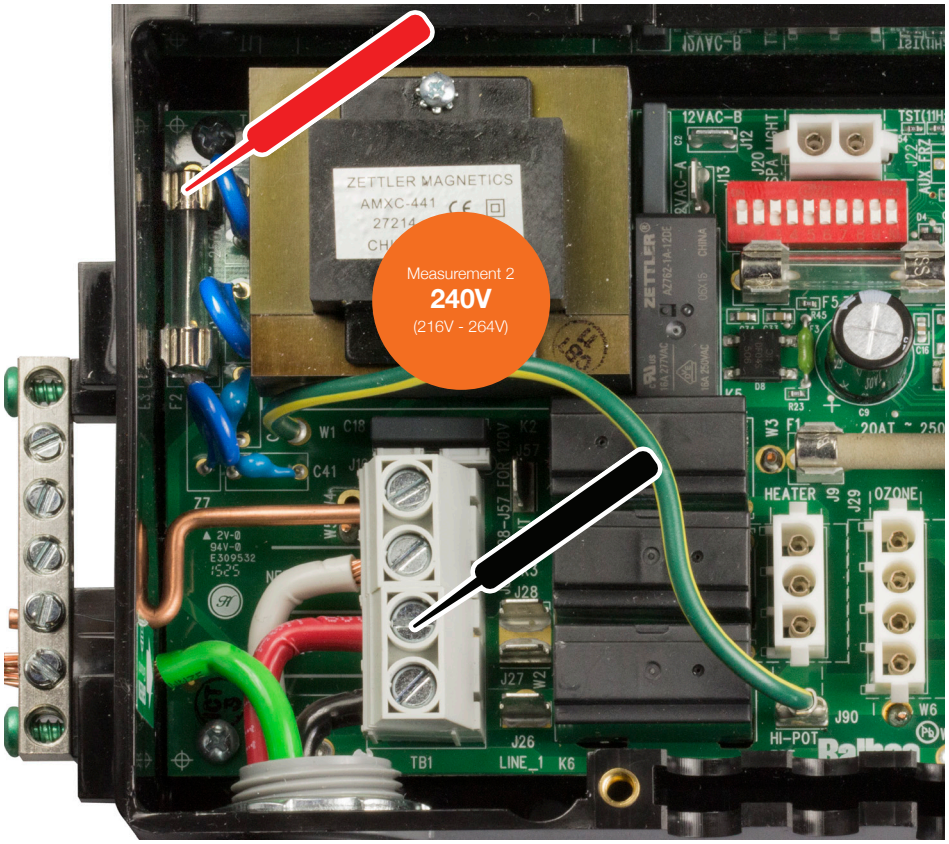
STEP 2

Measure voltage between the terminal block and fuse. The fuse is labeled F2 on the circuit board.



If measurement 2 it is not 240V, replace the fuse. And, go to step 4.

If measurement 2 is 240V, replace the system pack.



STEP 3

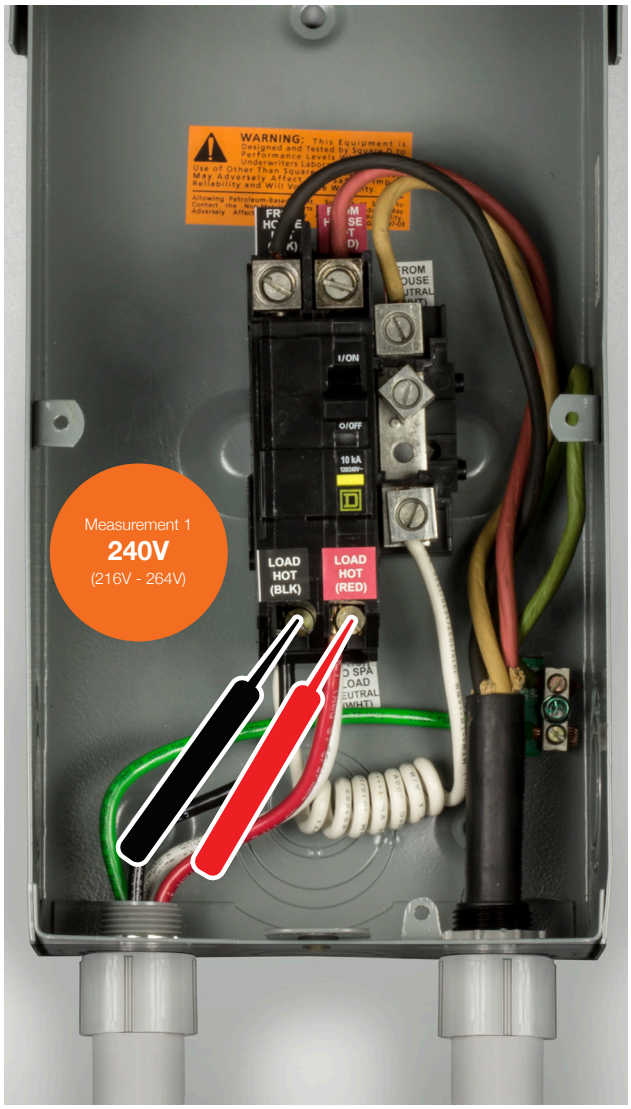
Verify voltage at the GFCI.

Measurement 1 is 240V.
LOAD HOT (BLK) to LOAD HOT (RED).

Measurement 2 is 120V.
LOAD HOT (RED) to LOAD NEUTRAL (WHT).

A - Remove faceplate from GFCI enclosure.

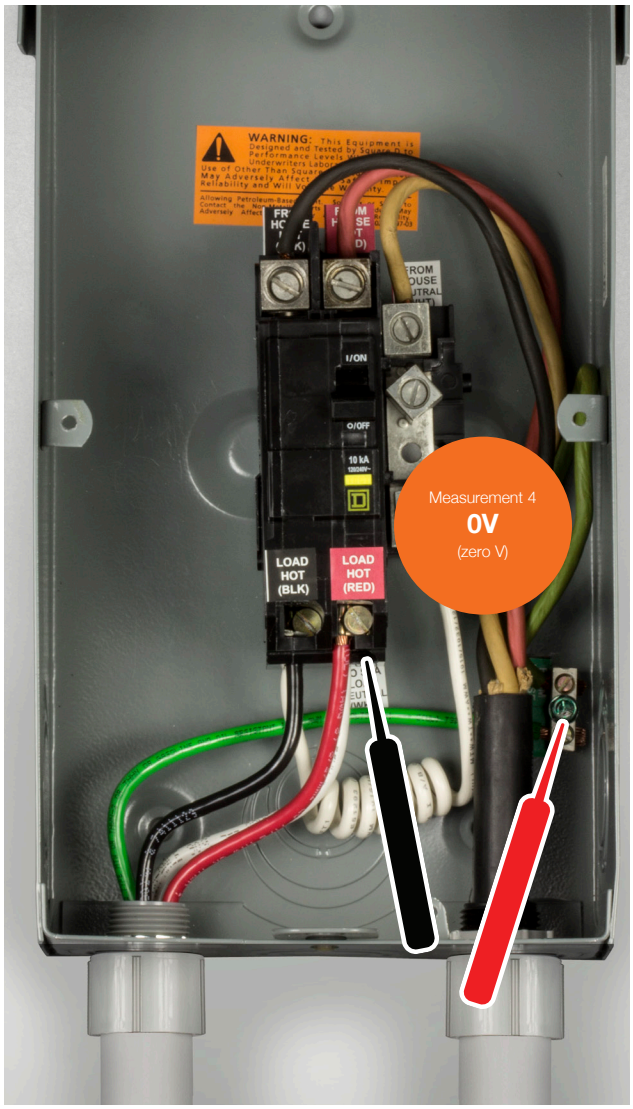
Faceplate removed.



STEP 3

Measurement 3 is 120V.
LOAD HOT (BLK) to LOAD NEUTRAL (WHT).

Measurement 4 is 0V.
LOAD NEUTRAL (WHT) to GROUND (GREEN).



If measurements 1 - 4 are inaccurate, the service voltage is faulty. Call an electrician.

STEP 4

Verify pump operates correctly in low and high speeds. If the pump does not run, proceed to pump troubleshooting: this is covered in a sparate troubleshooting guide.

Press the pump button to turn ON the pump at low speed. Press the button again for high speed. The third press turns OFF the pump.

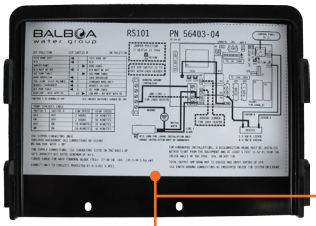
If the pump runs properly, proceed to step 5.

STEP 5

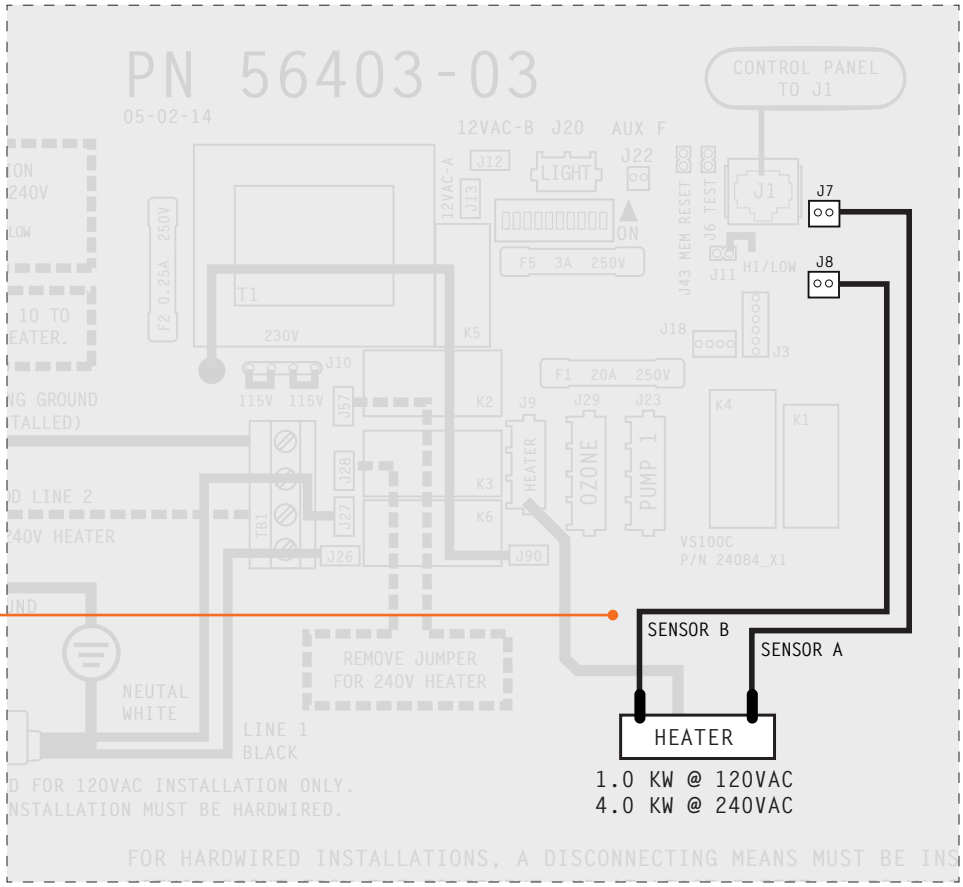
Confirming the temperature sensors and the circuit board in the system pack are working properly. This process will be covered in steps 5 - 8.

There are two temperature sensors on the wire diagram, and they are labelled " sensor A" and "sensor B." Sensor A connects to position "J7" on the circuit board. Sensor B connects to position "J8" on the circuit board.

System Pack Lid



Wire Diagram

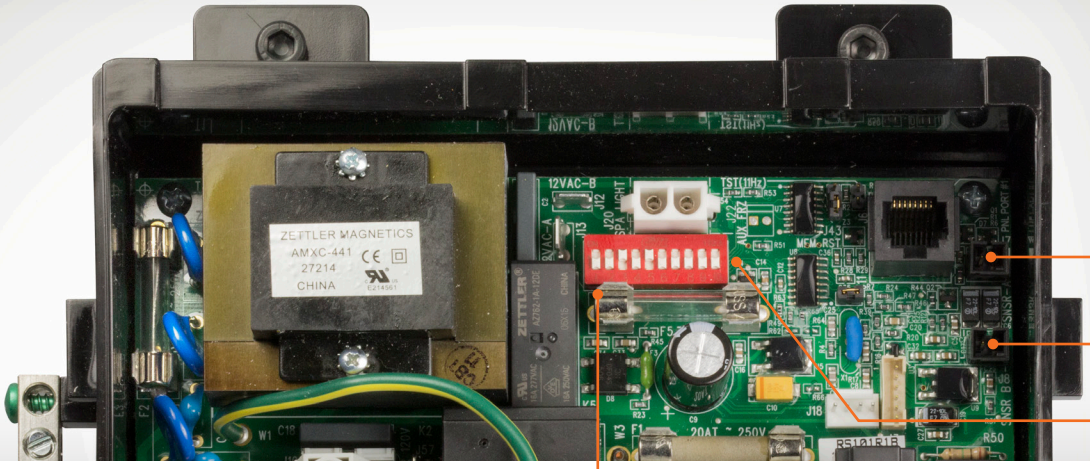


STEP 5

Water Heater

Temperature Sensor B

Temperature Sensor A



Temperature sensor A connects to J7 and temperature sensor B connects to J8 on the circuit board.

Connector J7

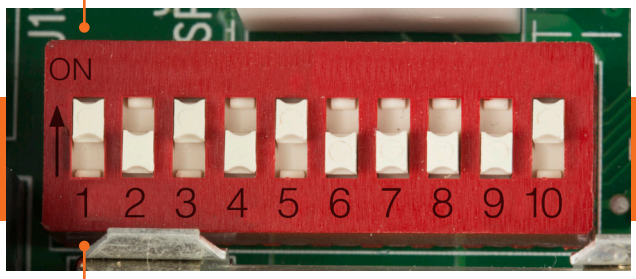
Connector J8

DIP Switch Bank

Put the system pack in “test mode” with the following steps.

A - Turn ON DIP switch #1.

Warning: high voltage components surround DIP switch 1. If the system pack is powered ON, use a non conductive tool for this step.



DIP switch 1 is the only switch that can be changed while the system pack is powered ON. At this point the system pack is in “test mode.” There is a DIP switch chart on the wire diagram. The chart shows factory default settings.

Wire Diagram. The DIP switch settings shown here are factory default.

OFF POSITION	DIP SWITCH #	ON POSITION
TEST MODE OFF*	◀ 1	TEST MODE ON*
N/A	◀ 2	N/A
DUPLEX PANEL	3 ▶	MINI PANEL
N/A MUST BE OFF	◀ 4	N/A MUST BE OFF

JUMPER POSITION
IF HEATER IS 240V
HI/LOW
J11

SET DIP SWITCH 10 TO OFF WITH 240V HEATER.

STEP 5

B - Perform temperature test #1. Turn ON the Light button on the topside panel.

C - The temperature reading from sensors A and B will appear on the panel display in a sequence. Write down the sensor names and corresponding temperatures. This information will be compared to the results from temperature test #2.

Message sequence for sensor A

"Sn" error code — Sensor A equals — 99°

Message sequence for sensor B

"Sn" error code — Sensor B equals — 50°

STEP 6

Switch temperature sensors A and B on the system pack circuit board with the following steps.

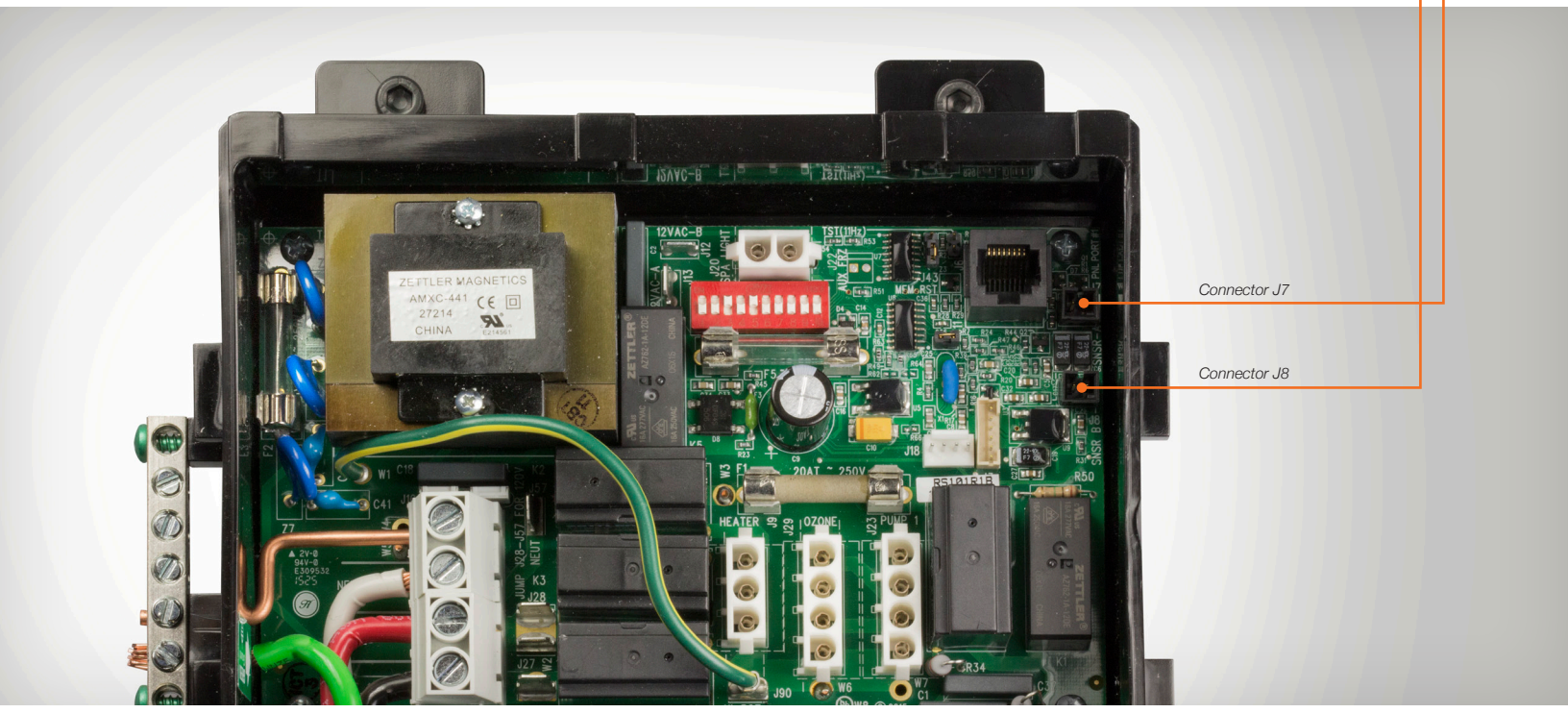
A - Power OFF the system pack at the GFCI.

B - At this point temperature sensor A is connected to J7 on the circuit board. And, temperature sensor B is connected to J8 on the circuit board. Disconnect both temperature sensors from the circuit board and reconnect them in opposite positions. Connect sensor A to J8, and connect sensor B to J7 (view below).

Water Heater

Temperature Sensor B

Temperature Sensor A



Connector J7

Connector J8

STEP 7

Perform temperature test #2 with the following steps.

A - Power ON the system pack at the GFCI.

B - Turn ON the light button on the topside panel.

C - The temperature reading from sensors A and B will appear on the panel display in a sequence. Write down the sensor names and corresponding temperatures. This information will be compared to temperature test #1.

Message sequence for sensor A

"Sn" error code → Sensor A equals → 99º

Message sequence for sensor B

"Sn" error code → Sensor B equals → 50º

STEP 8

Compare the results from temperature test #1 and #2. The comparison will determine one of two things: one, the sensors are faulty or two, the circuit board is faulty. To illustrate the troubleshooting concept, lets set up two scenarios.

Scenario #1

test #1
Sensor A = 99º
Sensor B = 50º

test #2
Sensor A = 99º
Sensor B = 50º

Temperature readings do not switch

In this scenario the system pack circuit board is faulty. How do we know this? The temperature readings did not switch after the temperature sensors were switched on the circuit board. Replace the whole system pack (not just the circuit board).

Scenario #2

test #1
Sensor A = 99º
Sensor B = 50º

test #2
Sensor A = 50º
Sensor B = 99º

Temperature readings switch

In this scenario the temperature sensors are faulty. How do we know this? The temperature readings switched after the temperature sensors were switched on the circuit board. Replace sensors A and B (not just one sensor).