

TESTING, SERVICE & REPAIR GUIDE
(FOR 2-4 CHAMBER WATER HEATING AND SPACE HEATING MODELS)



READ THE GENERAL SAFETY SECTION BEGINNING ON THE NEXT PAGE AND THEN THIS ENTIRE MANUAL BEFORE SERVICING OR OPERATING THIS UNIT. IF YOU DON'T FOLLOW THESE SAFETY RULES, THE UNIT MAY NOT OPERATE PROPERLY AND COULD CAUSE, SERIOUS BODILY INJURY, PROPERTY DAMAGE AND/OR DEATH.

READ YOUR WARRANTY. WARRANTY OF YOUR UNIT WILL DEPEND ON PROPER INSTALLATION AND OPERATION. THE WARRANTY SHALL BE VOID IF THE UNIT HAS BEEN ALTERED IN ANY WAY WHATSOEVER. THE MANUFACTURER OF THIS HEATER WILL NOT BE LIABLE FOR ANY DAMAGES DUE TO FAILURE TO COMPLY WITH THE MAINTENANCE AND INSTALLATION INSTRUCTIONS OUTLINED ON THE FOLLOWING PAGES.

IF YOU HAVE ANY QUESTIONS OR REQUIRE ANY ASSISTANCE WITH THE INSTALLATION OR REPAIR OF THIS UNIT, PLEASE CONTACT OUR CUSTOMER SERVICE DEPARTMENT AS LISTED BELOW. PLEASE HAVE THE INFORMATION DETAILED BELOW WHEN CALLING :

SERIAL #: _____ MODEL #: _____ INSTALLATION DATE: _____

SEISCO INTERNATIONAL LIMITED

241 Airtex Dr. • Houston, TX 77090

•Toll Free (888) 296-9293

Phone (281) 876-3300 • Fax (281) 876-3338 • service@seisco.com

GENERAL SAFETY

WARNING

VERIFY THAT THE HEATER HAS THE CORRECT NUMBER OF DEDICATED UNIQUE 208/240V CIRCUITS, USING CORRECTLY RATED WIRES AND CIRCUIT BREAKERS AND THAT CIRCUIT BOARD JUMPERS ARE INSTALLED WHERE NECESSARY. FAILURE TO **GROUND THE SYSTEM** MAY RESULT IN DEATH OR SERIOUS INJURY

WARNING

IMPROPER INSTALLATION, ADJUSTMENT, ALTERATION, SERVICE OR MAINTENANCE CAN CAUSE **DEATH, SERIOUS BODILY INJURY OR PROPERTY DAMAGE**. REFER TO THIS MANUAL FOR ASSISTANCE OR CONSULT QUALIFIED PERSONNEL.

WARNING

HAZARD OF ELECTRICAL SHOCK! BEFORE REMOVING THE COVER OR SERVICING THE UNIT, MAKE SURE THE ELECTRICAL SUPPLY TO THE UNIT IS DISCONNECTED. FAILURE TO DO THIS COULD RESULT IN DEATH, SERIOUS BODILY INJURY, OR PROPERTY DAMAGE. DEPENDING ON YOUR INSTALLATION, IT MAY BE NECESSARY TO TURN OFF **MULTIPLE BREAKERS** TO COMPLETELY POWER DOWN YOUR UNIT.

WARNING

WHEN INSTALLING THE UNIT IN ANY AREA WHERE LEAKS OF ANY NATURE COULD CAUSE PROPERTY DAMAGE, A **DRAIN PAN** WITH A 1" MINIMUM DIAMETER DRAIN HOLE AND DRAIN LINE SUFFICIENT TO CONTAIN THE FLOW OF WATER PROVIDED BY THE SUPPLY LINE **MUST** BE INSTALLED.

FOR HYDRONIC HEATING APPLICATIONS, A **30-PSI MAXIMUM PRESSURE RELIEF VALVE** WITH DRAIN LINE **MUST** BE INSTALLED.

WARNING

QUALIFIED SERVICE PERSONNEL SHOULD ONLY ATTEMPT SERVICE. HAZARD OF ELECTRICAL SHOCK! IMPROPER ADJUSTMENT, ALTERATION, SERVICE OR MAINTENANCE CAN CAUSE **DEATH, SERIOUS BODILY INJURY OR PROPERTY DAMAGE**. CONTACT SEISCO FOR ASSISTANCE IN LOCATING QUALIFIED SERVICE PERSONNEL IN YOUR AREA

WARNING

YOUR SEISCO® MUST BE INSTALLED AND SERVICED BY QUALIFIED PERSONNEL. DAMAGE TO YOUR UNIT, SERIOUS PERSONAL INJURY OR DEATH MAY OCCUR IF INSTALLED OR HANDLED IMPROPERLY. CARE MUST ALWAYS BE USED TO AVOID ELECTRICAL ACCIDENTS WHEN INSTALLING OR SERVICING. NEVER USE PARTS THAT ARE NOT ORIGINAL EQUIPMENT OR APPROVED ALTERNATE REPLACEMENT PARTS.

DOs & DON'Ts

Your **SEISCO®** is designed for easy maintenance. **AVOID INSTALLATION IN CONFINED SPACES.** Allow at least 18 inches of working space above and below your unit. Installing any water heater in your attic or any other location that is not easily monitored can result in unexpected property damage. Your **SEISCO®** is so small and attractive, you should NEVER need to install it in attics or areas difficult to monitor or service.

WHEN INSTALLING THE UNIT IN ANY AREA WHERE LEAKS OF ANY NATURE COULD CAUSE PROPERTY DAMAGE, A **DRAIN PAN WITH A 1" MINIMUM DIAMETER DRAIN HOLE AND DRAIN LINE SUFFICIENT TO CONTAIN THE FLOW OF WATER PROVIDED BY THE SUPPLY LINE MUST BE INSTALLED.**

FOR HYDRONIC HEATING APPLICATIONS, A **30-PSI MAXIMUM PRESSURE RELIEF VALVE WITH DRAIN LINE MUST BE INSTALLED.**

Your **SEISCO®** should require very little maintenance. In areas of hard water, it is advisable annually, to remove its detachable base plates and clean out any mineral deposits from the chambers.

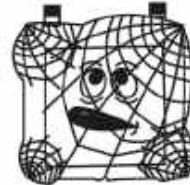
NEVER POUR OR SPRAY LIQUIDS DIRECTLY ON THE UNIT THAT MIGHT ENTER THE CASE, POSSIBLY CAUSING DAMAGE TO YOUR UNIT.

Your **SEISCO®** is designed for safe operation and ease of service. Qualified service personnel must service your unit only. **BEFORE YOUR UNIT IS TO BE SERVICED, ALWAYS TURN OFF ALL MAIN, POWER CIRCUIT BREAKERS TO THE UNIT.** After servicing, always **RUN WATER** through your unit before turning the power on.

YOUR SEISCO® MUST BE INSTALLED AND SERVICED BY QUALIFIED PERSONNEL. DAMAGE TO YOUR UNIT, SERIOUS PERSONAL INJURY OR DEATH MAY OCCUR IF INSTALLED OR HANDLED IMPROPERLY. CARE MUST ALWAYS BE USED TO AVOID ELECTRICAL ACCIDENTS WHEN INSTALLING OR SERVICING. NEVER USE PARTS THAT ARE NOT ORIGINAL EQUIPMENT OR APPROVED ALTERNATE REPLACEMENT PARTS.

Protect your **SEISCO®** from the weather. It is an appliance, and you must avoid installing this **SEISCO®** in unprotected areas where it might be exposed to rain, excess humidity, freezing conditions, etc.

Your **SEISCO®** is designed to operate **ONLY** when mounted vertically. Do not attempt to mount any other way as permanent damage to your unit will result with possible catastrophic failure and significant water leakage.



REPAIR GUIDE

PRECAUTIONS:

1. **SMOKE/WATER:** Do not remove the protective cover to the heater if there is smoke present or water leaking from the heater. Immediately turn off all power and water/fluid supply to the heater.
2. **POWER:** There may be up to four (4) electrical circuits connected to your heater. You must verify that all breakers and/or disconnects serving these circuits are turned off before performing service and repair work.
3. **TOOLS:** Testing & repairs may require special tools and training to use them. If you do not have the tools and experience, contact a local electrician or heating & air-conditioning technician to perform these procedures. Note: you may be subject to labor charges for this service.
4. **ELECTRONICS:** When performing service work on the heater, try not to drip water or other fluids onto the control board. If water or fluids do get on the control board, dry it off with a hair dryer. Do not attempt to turn on the power until the control board has been thoroughly dried.
5. **TIGHTENING:** Do not over tighten or over torque parts such as heating elements, temperature sensors and limit switches.

VISUAL CHECKS:

6. **INSTALLATION:** Is the heater mounted upright with the plumbing on top? See Owner's Manual that is included with your heater.
7. **CONNECTIONS:** Is the heater connected to the plumbing system correctly (hot on the left, cold on the right)? See Owner's Manual that is included with your heater.
8. **REVERSE FLOW:** Can fluid flow backwards through your heater? Install a check valve on the outlet to prevent reverse flow.
9. **LEAKS:** Are there any water or fluid leaks around the heater?
10. **FAUCETS:** Are the sink fixtures plumbed correctly (hot on the left, cold on the right)?
11. **DAMAGE:** Does there appear to be any damage to the heater or did any occur during installation (plumbers solder, sheetrock mud, paint, or water on the circuit board)?
12. **WIRES:** Are there any wires disconnected or hanging from the heater? (All wires should be securely connected to a terminal or lug)

FUNCTIONAL CHECKS:

13. **BREAKERS:** Are all of the breakers turned on?
14. **VOLTAGE:** Is there voltage at the control board? Measure across power lugs L1 & L2. See "Power Check" Section #1
15. **FLOW:** Is the combined flow usage too high for the capacity rating of the water heater model?
16. **HEATING:** Does the outlet pipe above the heater on the left get hot to touch while running operating? If so and the faucet runs cold, check faucet or plumbing for correct installation. If the pipe does not get hot, proceed with following diagnostics and testing for the heater.

REPAIR GUIDE

SECTION 1. POWER CHECK

POWER LUGS

Verify the voltage from the incoming power supply at L1 and L2 power lugs for each circuit to the control board. Identify the power lugs to the far right of control board where the incoming power supply wires connect to the board. With your voltmeter set to a range of 250 VAC or more and place the red probe on the very top right power lug on the control board marked (L1) and the black probe on the lug immediately below (L2) to verify voltage is 220 Volts to 250 Volts (AC). After verifying the voltage is in this range at this circuit move down to the next pair of power lugs beginning with L1 and L2 performing the same check. Repeat voltage verification for all sets of lugs.

CIRCUIT PHASING CHECK

If the circuit voltage is zero then the incoming power supply is not connected or is out of phase. This means that one of the wires is the same phase as the other. In either case you will not get power. First check all the breakers in the panel box for the heater by turning them off and then back on again. If the breakers are all on and you still do not have the voltage between 220 Volts and 250 Volts, then identify which 2 circuits do not show the proper voltage. If this is the case, then this would indicate that these two circuits are wired out of phase. To verify, perform the following phase check. Start as you did above with the red probe on the L1 lug of the circuit that does not have voltage between 220 Volts and 250 Volts. Take your black probe and move it to the L1 power lug of the 2nd circuit that does not indicate proper voltage. If you do not measure voltage between these two L1 lugs, then move the black probe to the L2 lug of the 2nd circuit. You should get the proper power with one of these combinations indicating that one of the wires in each circuit should be removed and placed on the other to obtain the voltage through proper phasing.

CORRECTING THE CIRCUIT PHASING

1. Identify which pair of wires on the circuit, where you have the red probe, gives you the proper voltage. Then turn off all power and verify. Remove the L2 wire in this first circuit and swap it with the wire from the second circuit that gave you the proper voltage.
2. Put the wire removed from the first circuit in its place. Make sure all the wire strands are in the lug and no strand is out of the lug in contact with the board.
3. Turn the power back on and again verify the power to each of the individual circuits between their respective L1 and L2 connections as described in the first paragraph of the "Power Check" even though you read zero voltage on a pair of wires each individual wire may still have 120 volts measured to the ground.

REPAIR GUIDE

SECTION 2. HIGH TEMPERATURE LIMIT SWITCHES

The high temperature limit protection switch(es) are located at the top of your heater. The high limit is designed to turn off and disable the heater if it exceeds its preset temperature limit.

LOCATING & TESTING THE HIGH LIMIT SWITCHES

1. Locate the brown wires running from the top of the control board and follow them to the limit switch on the left at the top of the chamber. In the center of the switch between the wire terminals there will be a small red button.
2. With all the power off to the heater, use the tip of a pen or pencil to push firmly on the red button to reset. You will hear a dull click as it resets and the button will feel loose in the switch.
3. Restore power to heater and verify all trouble codes have cleared
4. Run the water at a hot water faucet (or run the pump in a space heating system) to verify heating and continue run it for about 3 minutes then stop the flow off the water abruptly.
5. Wait about 5 minutes then go back and start the flow and verify heating. If you have repeated tripping, try reducing the set point of the unit by adjusting the temperature knob counterclockwise slightly.
6. If the limit continues to trip, continue to test the sensors, elements and control board.

SECTION 3. TEMPERATURE SENSOR RESISTANCE CHECK

Temperature sensors that have been damaged, failed or over time are simply not reading correctly can greatly affect the performance of the heater. Heaters manufactured in the last 10 years use 10K Ohm resistors. These sensors will have white or black wires and will give you readings from 8,000 to 15,000 ohms. If your readings are not in this range, check your meter settings. Once your meter is set correctly, proceed to testing. If your heater has red and green wires on the sensors, consider replacement of the entire unit.

ALL POWER MUST BE TURNED OFF BEFORE DOING THIS RESISTANCE CHECK.

CHECKING THE SENSOR WIRES

1. First, check the sensor wires by performing a Continuity Test to verify they are not defective. Replace any bad sensor wires before proceeding with the following sensor checks:
2. TEMPERATURE SENSOR RESISTANCE CHECK
3. With the power off open a hot water valve and run cold water through the heater for 5 minutes (on SH models, activate the pump).
4. Note: The goal is for all sensors to be reading the same temperature when testing. If one of the sensors varies by more than 10% when measured, it should be replaced. If the heater is more than 5 years old, replacement of all sensors is recommended.

REPAIR GUIDE

TESTING THE SENSORS

1. Place one of the multi-meter probes on each of the two connection terminals of each sensor where it connects to the control board and record the measurement. Start with the inlet water sensor. This is the sensor at the bottom of the inlet water tube under the heater on the right. It is called TH-IN.
2. Next go to the top of the chamber at the far right, chamber 1 and move left to the top of the 2nd chamber for TH-1. At the bottom of this chamber is TH-2. Then proceed to the top of the last chamber at the left for TH-3 and finally to the bottom of this chamber for TH-4..
3. **IMPORTANT:** If you find that the reading for TH-1 sensor is higher than TH-2 by more than 1000 ohms you should swap these sensors positions putting the TH-1 in the place of the TH-2

SECTION 4. REPLACING A TEMPERATURE SENSOR

4. Turn off the power and close the shut-off valve to the heater. Remove the base plate to the chamber in which the sensor is located, and drain the heater. After draining the heater, clean the base plate, seal and sealing area and replace.
5. Remove the sensor's connections from the board while holding the board to prevent it from flexing, use small needle-nosed pliers to pull the terminal loose. Do not pull on the wire itself.
6. Carefully remove the sensor unscrewing it counterclockwise with a wrench or pliers.
7. Verify that the new sensor has the correct seal for your heater, if not unscrew the seal from the old sensor. Do not attempt to pull it off, as you will damage it. Carefully replace the seal on the new sensor. If the seal is damaged, contact Seisco for a replacement.
8. With your fingers, replace the new sensor with seal into the chamber. Be careful not to cross-thread the part. The sensor should go back in finger tight. Then take a small wrench and tighten up the sensor until it is snug – about a quarter turn. Be careful not to over tighten the part as you may damage the chamber.
9. Run the water and check for leaks. If the sensor needs a little more tightening you can do it safely.

CAUTION: If for any reason you get any water or fluid on the control board, use a hair dryer and immediately dry the board for several minutes. Make sure to dry behind the board. Do not restore power to the heater until the board is COMPLETELY DRY.

After replacement ALWAYS PERFORM THE “MATCHING PROCEDURE” IN SECTION #7

REPAIR GUIDE

SECTION 5. HEATING ELEMENT RESISTANCE CHECK

WARNING: DO NOT ATTEMPT THIS PROCEDURE UNLESS ALL THE POWER TO THE HEATER IS TURNED OFF AND YOU HAVE VERIFIED IT WITH YOUR VOLT METER.

RESISTANCE CHECK

1. Set your multi-meter to ohms (Ω) and the range at 10 or 20 ohms.
2. Place your meter probes on each of the two terminal screws at the top of the element. You do not have to remove the element wires. You should read from 7 to 15 ohms for a good heating element.
3. If an element reads zero, it has failed and must be replaced.
4. If you replace the element with another brand, verify the length will fit in the chamber and that the wattage is the same or less than the element you are replacing and the voltage is the same. The O-Ring seal from the original element MUST be used to avoid leaks or damage to the chamber when using an element of another brand.

REMOVAL & REPLACEMENT

1. Turn off the power and close the shut-off valve to the heater. Remove the base plate to the chamber in which the element is located, and drain the heater. After draining the heater, clean the base plate, seal and sealing area and replace.
2. Disconnect the wires from the top of the element by removing the two screws.
3. Use a standard element wrench to loosen the element.
4. Carefully remove the element by hand, being careful to wrap the element in a towel or rag as you slowly pull it out to avoid any water on the circuit board.
5. Remember to retain the O-Ring from the old element as necessary
6. Install the new Element/O-Ring by hand. Be careful not to cross-thread the part. The element should go back in finger tight. Then take the wrench and tighten up the element until it is snug – about a quarter turn. Be careful not to over tighten the part as you may damage the chamber.
7. Open the valve slowly and check for leaks. If the element needs a little more tightening you can do it safely.
8. If no leaks, slowly shut off the hot water faucet or valve pressurizing the heater and continue to check for leaks. If none, leave a towel around the element and leave it sit for 15 minutes.
9. If no leaks, remove towel and connect wires to element.
10. Turn all the power back on. Verify for at least 15 minutes that there is no leaks. Open the hot water faucet several times to verify no leaks.

REPAIR GUIDE

SECTION 7. MATCHING PROCEDURE

The matching procedure enables the temperature sensors to be properly matched to the control board. It is required after replacing a control board and may be necessary after adjusting or replacing temperature sensors or resetting a High Limit Switch.

1. TURN OFF POWER to the heater. With the power off, open a hot water faucet and run cold water through the heater for 5 minutes (on SH models, activate the pump). Note: The goal is for all sensors to be reading the same temperature when performing the match.
2. With the power off and fluid flowing through the heater, DISCONNECT ONE OF THE HIGH LIMIT WIRES (brown wire) from the top of the control board. (This will prevent the heater from heating while you are performing the balance of the procedure)
3. RESTORE POWER to the heater. The control board will beep and the LED will flash red and green. This is normal.
4. LOCATE THE BLUE BUTTON on left side of the control board.
5. PRESS & HOLD BLUE BUTTON in continuously for about 10 seconds, then release.
6. After releasing the blue button, there should be a distinctive LOW TONE BEEP TONE. (This is the confirmation tone that the match was successful) If no low tone beep is heard, REPEAT from step #5*
7. TURN OFF ALL POWER
8. CLOSE THE FAUCET
9. RECONNECT THE BROWN WIRE
10. RESTORE POWER to the heater

* NOTE: If there is no confirmation tone beep after 3 or 4 attempts, then perform the “Temperature Sensor Resistance Check” in Section #3.

REPAIR GUIDE

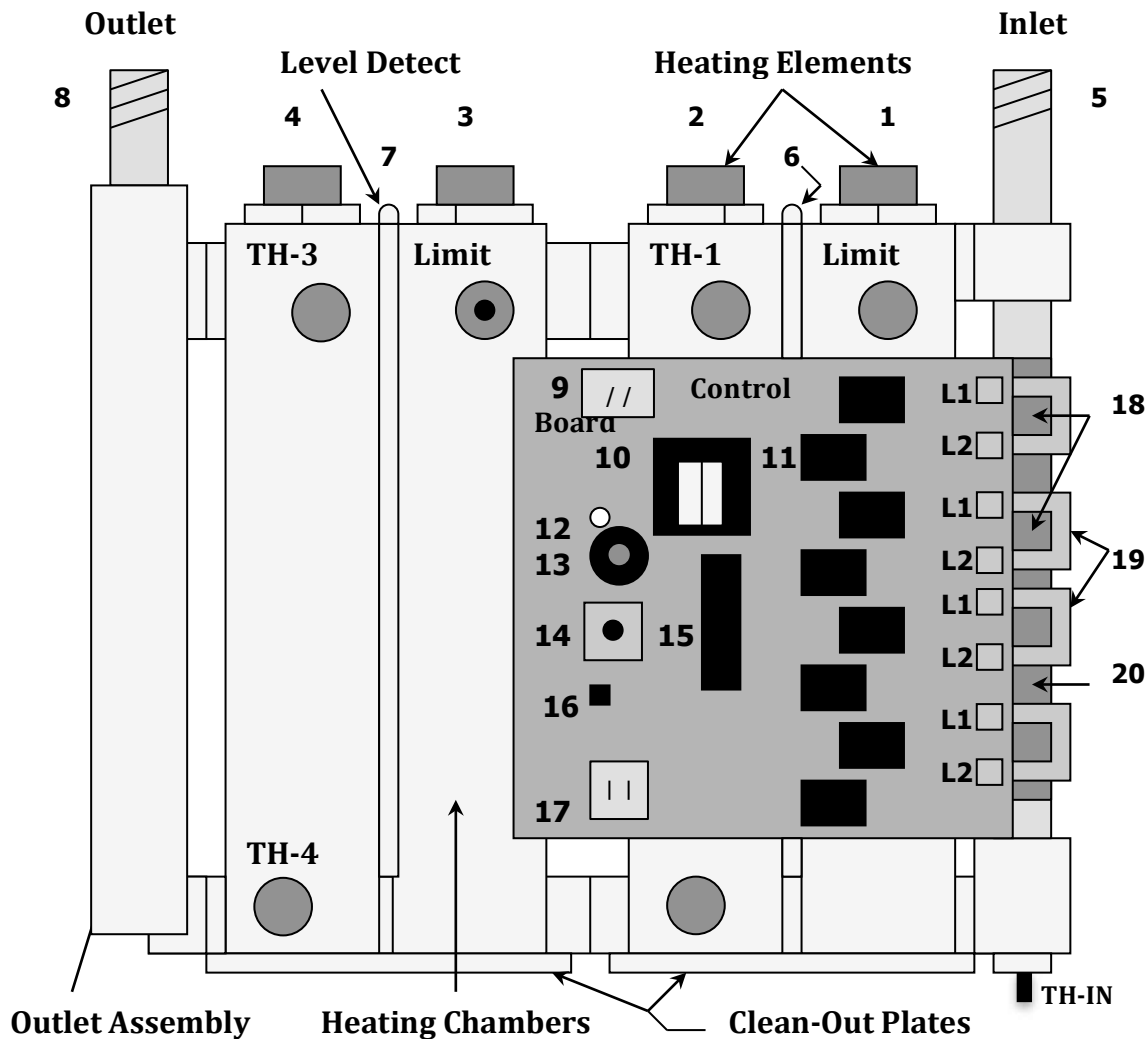
READING DIAGNOSTIC CODES: The LED status lamp located on the control board will flash a three-part sequence of red flashes, each representing the individual digits of the code. After each sequence, the LED will flash green and then repeat the diagnostic code. THERE MAY BE MULTIPLE CODES SO VERIFY ALL SEQUENCES. Press the small blue mode button on the control board for two seconds, and the speaker will audibly beep the code as it flashes.

DIAGNOSTIC CODES

Code	Description	Action
111	TH-IN Sensor	Turn off all the power to the heater. Cool down the heater by running the pump for about 5 minutes. Check the resistance measurement for all temperature sensors.
112	TH 1	
113	TH 2	
114	TH 3	
115	TH 4	
117	Shorted Temp Sensor	Indicates sensor is shorted closed. Check wiring, replace as necessary
118	Open Temp sensor	Indicates sensor is open. Check wiring, replace as necessary
121	Disable Switch Open	Install jumper on circuit board or verify operation of demand meter, pump relay or any other device connected to disable circuit
122	High Limit Switches	Turn off all power to the heater. Reset the switch by pushing in the button on the switch itself. Check the switch and brown wires for continuity. (Check Temperature sensors and run matching procedure before replacing Limit Switch)
123	Level Detect(s)	Check that the heater is filled with fluid and that there is no air trapped inside. Check operation of Air Separator. If the heater is filled and there are no leaks, connect level detect spades on the board to ground. If code is accompanied with a clicking sound that is present when water is running check the heating elements.
124	High Temperature Shutdown	Code 124 is triggered when the temperature of the water is more than 10 degrees higher than the set point at the last sensor or THIN.
126	Moisture Detect	Immediately shut off all power to the heater. Check for fluid leaks. Completely dry control board before restoring power.
132	High Voltage	Voltages higher than 10% above the nominal rating should be corrected. Code will clear when voltage returns to nominal range.
133	Low Voltage	Low voltage may reduce heating capacity of the heater. Sustained voltages below 20% of the nominal rating may cause the heater to shut down. Code will clear when voltage returns to nominal range.
134	Element #1	Check elements. Check Temperature Sensors. Check Wiring and Breakers. Verify proper heater sizing, if necessary reduce unit temperature from maximum setting.
135	Element #2	
136	Element #3	
137	Element #4	
142	Data Reading Error	The heater needs to be reset. Turn off all breakers to the heater for approx. 30 seconds. Turn on breakers, the LED should flash all green and unit should heat. If the code remains, reset the breakers again. If code persists, test sensors and perform Matching Procedure. If the code does not clear, replace control board and/or sensors.

FOUR CHAMBER MODELS

INTERNAL WORKINGS AND PARTS IDENTIFICATION

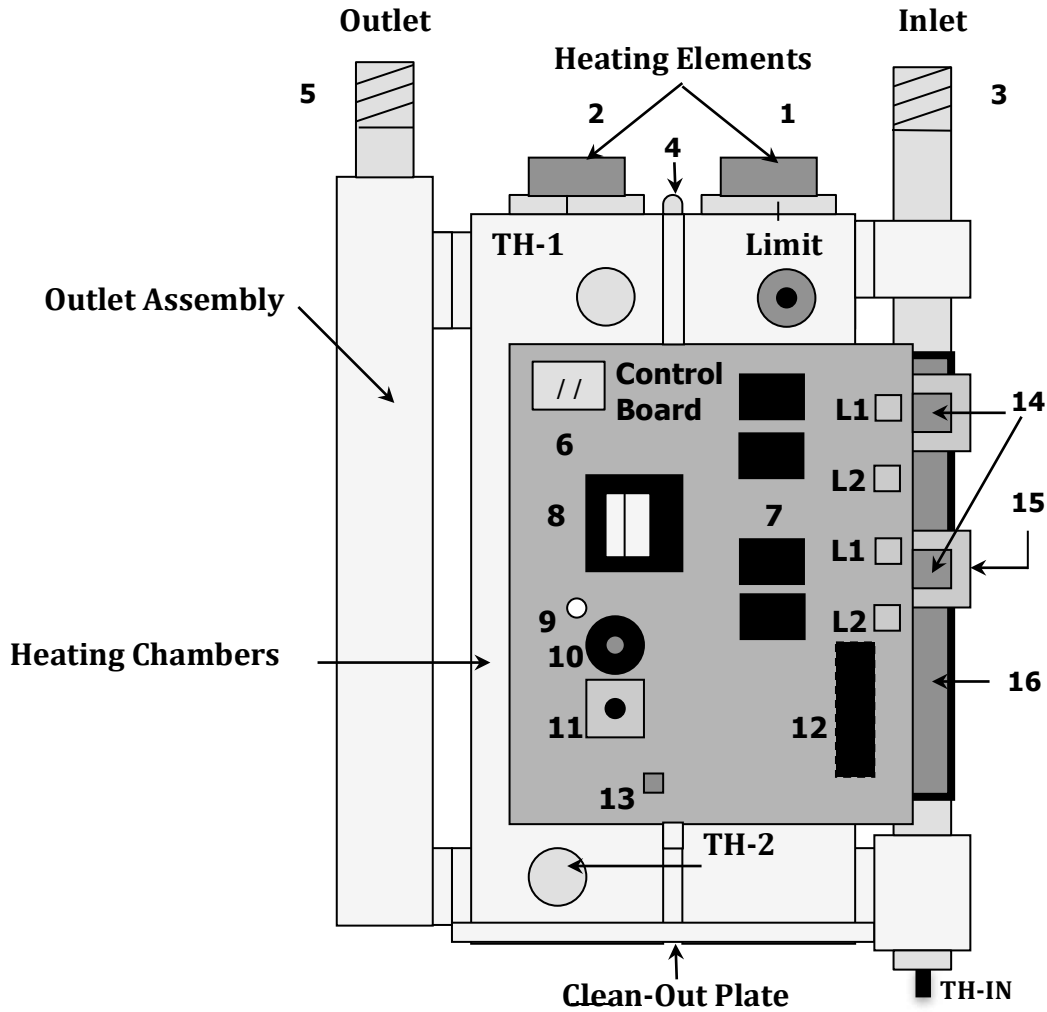


- LEGEND**
- 1 - Heating Element #1
 - 2 - Heating Element #2
 - 3 - Heating Element #3
 - 4 - Heating Element #4
 - 5 - Inlet Water Tube, 3/4" NPT
 - 6 - Water-Level Detect Screw
 - 7 - Water-Level Detect Screw
 - 8 - Outlet Water Tube, 3/4" NPT
 - 9 - Disable, Demand Control Jumper
 - 10 - Transformer
 - 11 - Heating Element Relays (8 ea.)
 - 12 - LED Light Indicator
 - 13 - Audible Speaker
 - 14 - Output Temperature Control
 - 15 - Microprocessor Control Chip

- LEGEND**
- 16 - Blue Button; Manual Audible Activation
 - 17 - Terminal Spades for Leak Detect Wires
 - 18 - Triacs (4 each)
 - 19 - Triac Mounting Blocks to Heat Sink (4 ea.)
 - 20 - Copper Heat Sink Tube
 - L1 - Power Connection Lugs (208 - 240 VAC)
 - L2 - Power Connection Lugs (208 - 240 VAC)
- Limit: Over Temperature Limit Switches (2)
- TH-IN: Inlet Temperature Sensor
 TH-1: Chamber Temperature Sensor #1
 TH-2: Chamber Temperature Sensor #2
 TH-3: Chamber Temperature Sensor #3
 TH-4: Chamber Temperature Sensor #4

TWO CHAMBER MODELS

INTERNAL WORKINGS AND PARTS IDENTIFICATION



LEGEND
1 - Heating Element #1
2 - Heating Element #2
3 - Inlet Water Tube, 3/4" NPT
4 - Water-Level Detect Screw
5 - Outlet Water Tube, 3/4" NPT
6 - Disable, Demand Control Jumper
7 - Heating Element Relays (4)
8 - Transformer
9 - LED Light Indicator
10 - Audible Speaker
11 - Output Temperature Control
12 - Microprocessor Control Chip
13 - Blue Button; Manual Audible Activation

LEGEND
14 - Triacs (2)
15 - Triac Mounting Blocks to Heat Sink (2)
16 - Copper Heat Sink Tube
L1 - Power Connection Lugs (208 - 240 VAC)
L2 - Power Connection Lugs (208 - 240 VAC)
Limit: Over Temperature Limit Switch
TH-IN: Inlet Temperature Sensor
TH-1: Chamber Temperature Sensor #1
TH-2: Chamber Temperature Sensor #2