RESIDENTIAL WATER HEATER
INSTALLATION & SERVICE GUIDE

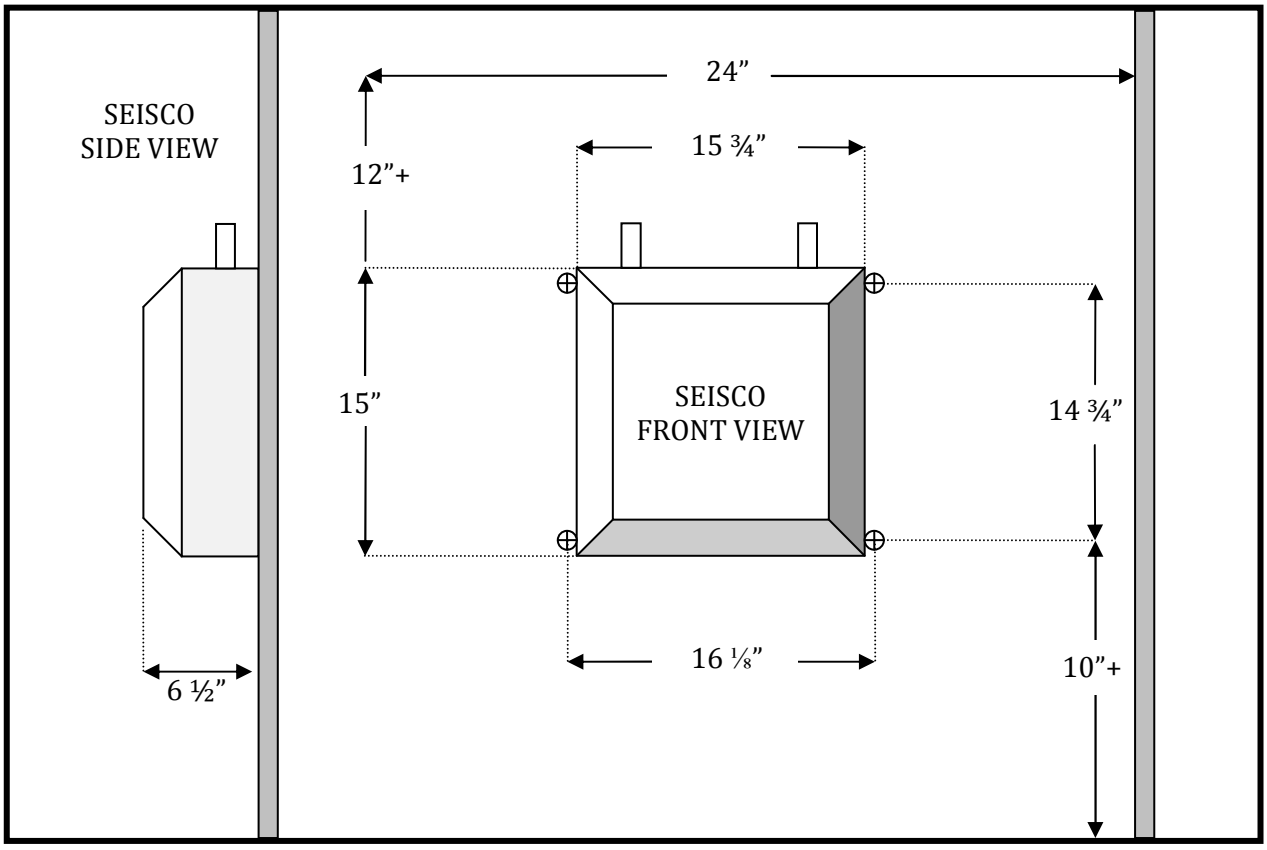
SEISCO International Limited
241 West Airtex
Houston, TX. 77090
(888) 296-9293

INSTALLATION AND SERVICE GUIDE - TABLE OF CONTENTS

I. INSTALLATION GUIDE

A. MOUNTING AND CLEARANCE REQUIREMENTS

1. Suggested Clearances



Top Clearance: For removal and maintenance of heating elements and to provide access for plumbing connections, a minimum of 12 inches is required.

Side clearance: Allow an overall minimum horizontal space for the heater of 24 inches for removal of protective cover screws and access to electrical wires entering the heater from the side.

Mounting height: For safety, ease of installation and service, the suggested height above the floor is 48 inches (minimum 10 inches). Electrical disconnect or sub-panels if required, should not be installed below heater as this may interfere with access to the clean out plates.

Front Clearance: In the absence of a door or removal access panel in front of the heater, allow 32 to 36 inch clearance in front of the heater for protective cover removal and ease of service.

2. Installation Guidelines

The SEISCO water heater should be installed as specified in the Federal Manufactured Housing Construction and Safety Standards (Standards) as further clarified in a letter from HUD, dated August 1, 2000.

In summary, the SEISCO water heater can be installed in any room, including closets, alcoves, utility rooms, and storage rooms, in which all walls and ceilings have a spread rating of 25 or less. Walls and ceilings consisting of unpainted or painted 5/16 inch or greater gypsum board or 5/16 inch or greater tape/textured gypsum board meet these flame spread ratings. When installed as such, the SEISCO can be mounted at any convenient location and without any additional enclosure.

If any of the walls or ceilings in a room have vinyl covered gypsum board, 5/16 inch or greater, the room may not meet the flame spread index of 25 or less, for the purpose of installing the SEISCO water heater. If one or more of the walls is paneling, the 25 or less flame-spread rating is not met. In these situations, the SEISCO water heater can be installed if a surrounding enclosure is constructed of 5/16 inch or greater gypsum. Vinyl covered gypsum board that is labeled with a flame-spread rating of 25 or less is acceptable to use in the water heater compartment without any additional enclosure.

Prevention of Storage

When the SEISCO water heater is installed in a closet, storage room or similar room, the area surrounding the appliance should be framed-in or guarded with noncombustible material such that the distance from the appliance to the framing or guarding is not greater than 3 inches. (When clearance required by the listing is greater than 3 inches, the guarding or framing shall not be closer to the appliance than the distance required by the listing.)

Clearance space around the SEISCO water heater is not required to be framed or guarded when the space is specifically design for a clothes washer or dryer, dimensions surrounding the appliance do not exceed 3 inches, or the home manufacturer affixes either to the side of the storage area or closet containing the appliance, or to the appliance itself, in a clearly visible location, a 3”X5” adhesive backed plastic laminated label or the equivalent which reads as follows:

> *“**WARNING:** This compartment is not to be used as a storage area. Storage of combustible materials or containers on or near any appliance in this compartment may create a fire hazard. Do not store any materials or containers in this compartment.”*

Temperature and Pressure (T&P) Valves

As of August 1, 2000, there is no longer any requirement to install a T&P Valve with the SEISCO water heater. The HUD letter recognizes and accepts the Underwriters Laboratories, Inc. (UL) Standard 499 endorsing the National Electrical Code (NEC) as an appropriate standard to the installation of valves for temperature and pressure relief as mandated by Standard 3280.609(c). Since the SEISCO water heater meets the requirements of UL 499 and NEC as a tankless water heater, there is no requirement for a T&P Valve when the SEISCO water heater is installed in a Manufactured Home.

National Electric Code

422-47. Water Heater Controls

All storage or instantaneous-type water heaters other than storage water heaters that are identified as being suitable for use with supply water temperature of 82ºC (180ºF) or above and a capacity of 60 kW or above, or instantaneous-type water heaters that are identified as being suitable for such use, with a capacity of 1 gal (3.785 L) or less shall be equipped with a temperature-limiting means in addition to its control thermostat to disconnect all ungrounded conductors, and such means shall be (1) installed to sense maximum water temperature and (2) be either a trip-free, manually reset type or a type having a replacement element. Such water heaters shall be marked to require the installation of a temperature and pressure relief valve.

FPN: See Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems, ANSI Z21.22-1986.

NOTE: A pressure relief valve is not required according to the NEC.

B. PLUMBING INSTALLATION GUIDE

1. Plumbing Connections

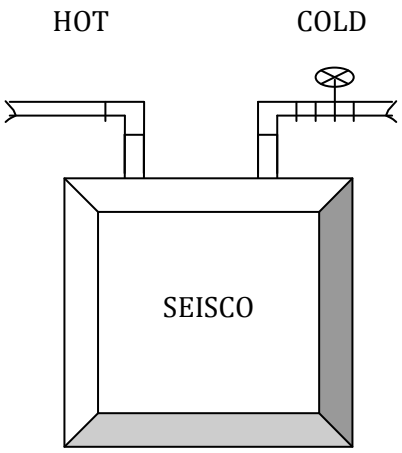
NOTE: This heater must be installed to meet the current National Electric Code, and any applicable Local Plumbing, Electrical, Heating and Air Conditioning Codes.

Places to avoid installing the SEISCO heater are in a crawl space under a house or building, in the garage (in regions prone to freezing or high humidity) and in the attic (unless the attic has been converted to living space). Like most appliances in the home, it is important to protect the SEISCO heater from exposure to damp, humid and freezing conditions. In these environments, condensation from sweating pipes above and near the SEISCO heater can drip down onto the plumbing connections and/or into the heater. This may cause corrosion at the plumbing connections or on components and electrical connections inside the heater. If it is necessary to install the SEISCO heater on the second floor or in the attic, a drip pan with a drain should be installed below the heater to avoid damage to ceilings, walls and floors in the event of a leak. A drip pan is normally required for storage tank heaters located in the attic or on the second floor as well.

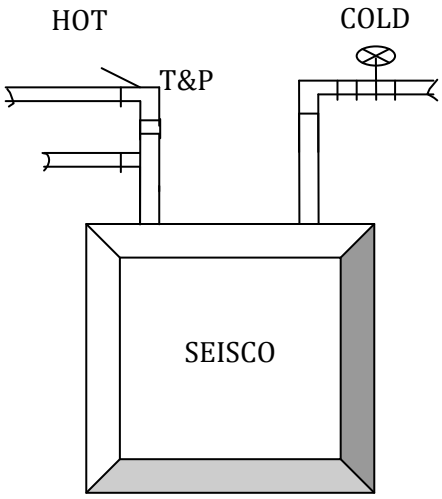
Unpack the heater from the shipping carton carefully. *Do not cut the shipping carton with a sharp instrument.* Stand the unit upright and remove the plastic wrap. Remove the screws that hold the front cover. After removing the front cover, locate the four (4) mounting holes in the metal back plate. Position the unit against the wall with the two inlet and outlet tubes pointed up toward the ceiling. Refer to *Mounting Clearances* in this section of the manual. Make sure the unit is level and attach to the wall with ¼ inch or larger lag bolts that are at least 1 ½ inches long. If attaching to sheet-rock or paneling, anchors or molly bolts should be used to prevent the screws from pulling through the wall. If the heater is to be installed on a cinder block or concrete wall, attach a ½ or ¾ inch section of plywood (20" x 20 " square) to the wall first. Then use wood screws to attach the heater to the plywood.

2. Attaching Water Supply

Use two wrenches when making any attachments of the water supply. Hold the heater's inlet and outlet fittings secure while attaching the cold water and hot water lines. Never attempt to attach water lines to the heater's fittings without using a second wrench to hold the fittings secure. The heater's inlet and outlet fittings are designed to turn freely. Never solder water supply lines to the heater's fittings. Heat from soldering may damage the heat exchanger. Do not use Plumber's Putty or PVC/CPVC primer and glue on the threads of the heater's inlet and outlet fittings. Some of the putty compounds on the market are very aggressive and could potentially dissolve the threads on the heater's fittings. PVC/CPVC primer and glue will also dissolve the threads on the heater's fittings. *Teflon Tape is the only sealer that should be used on the threads of the inlet and outlet fittings.*



Above diagram shows approved plumbing connections without T&P Valve (T&P not required by manufacturer).



Above diagram shows plumbing connections with a T&P Valve if required by local codes.

Temperature & Pressure Valve

A temperature and pressure relief valve (T&P Valve) may be required by local code. When a T&P valve is installed it should be checked after the water supply to the heater is turned on. With the water supply on, there should be no water flowing from the valve. Operate the valve manually two or three times to purge the trapped air from the top of the heater's chamber then close the valve. Verify that water has stopped flowing completely before connecting the drain pipe to the valve.

As the SEISCO heater does not utilize a storage tank, the use of a T&P relief valve is not required by many national standards, including UL standard 499. SEISCO heaters are designed with control logic as well as electro-mechanical high limit thermostat switches for over-temperature protection. Because of these built-in safety features, the use of a T&P relief valve is not required.

Drain Pan

If the SEISCO heater is installed in an area where water damage can occur to the area adjacent to the heater, a drain pan must be installed. The pan must be at least 2½ inches deep and large enough to protect the area below the heater (the pan should be at least 1 inch larger than the lower external dimensions of the heater) and must be piped by minimum 1 inch pipe to a suitable drain capable of discharging 10 GPM. A splash cover must be included to protect the area of attachment to the wall.

NOTE: THIS HEATER MUST BE INSTALLED TO MEET THE CURRENT NATIONAL ELECTRICAL CODE, AND ANY APPLICABLE LOCAL PLUMBING, ELECTRICAL, AND HEATING & AIR CONDITIONING CODES.

C. ELECTRICAL INSTALLATION GUIDE

1. Connection to Power Supply

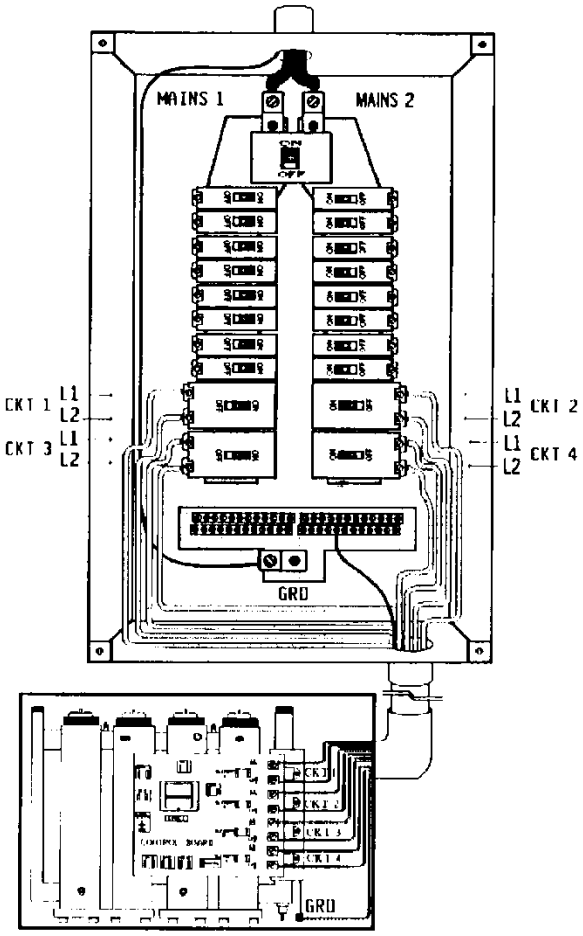
WARNING: Installation and Service must be performed by qualified personnel only.

Install wiring (see wiring diagram) from the unit to the Main Power Circuit Breaker Panel. Connect the wiring to the unit as shown on the wiring diagram attached to the inside of the unit's cover.

WARNING: MODELS RA-14 THROUGH RA-28 REQUIRE MULTIPLE POWER SOURCES. WHEN WIRED DIRECTLY TO THE BREAKER BOX, THEY REQUIRE MORE THAN ONE DOUBLE POLE CIRCUIT BREAKER.

RISK OF ELECTRICAL SHOCK: HEATING ELEMENT IS NOT GROUNDED. SOME UNITS HAVE MULTIPLE POWER SUPPLIES. DISCONNECT ALL POWER SUPPLIES BEFORE SERVICING.

WHEN USING STRANDED WIRE, MAKE SURE THAT ALL STRANDS ARE SECURE INSIDE THE TERMINAL BLOCK. A LOOSE STRAND CAN CAUSE A SHORT AND DAMAGE THE CIRCUIT BOARD.



HEATER SUPPLY SIDE CONNECTION

FOR MODELS RA-9 THROUGH RA-11, ONE PAIR OF WIRES SHOULD BE ATTACHED WITHIN THE UNIT AT POWER CIRCUIT 1 (CKT 1)-ONE WIRE TO L1 AND ONE WIRE TO L2. FOR MODELS RA-14 THROUGH RA-22, A SECOND PAIR OF WIRES MUST ALSO BE ATTACHED AT POWER CIRCUIT 2 (CKT2)-ONE TO L1 AND ONE TO L2. FOR MODEL RA-28, A THIRD AND FOURTH PAIR OF WIRES ARE REQUIRED FOR POWER CIRCUITS 3 AND 4 (CKT 3 & CKT 4).

NOTE: WHERE REQUIRED BY CODE, USE A DISCONNECT SWITCH ADJACENT TO THE HEATER. WHEN MAKING THIS TYPE OF INSTALLATION, BE SURE THE MAIN FEEDER WIRES USED ARE PROPERLY SIZED.

Install the proper size circuit breaker (see Product Specifications). Be sure that the unit-to-power supply circuits are properly connected. For model RA-9 - RA-11, the pair of feeders attached to power circuit 1 (CKT 1) should be attached to one 2-pole breaker, and for models RA-14 - RA-22, the second pair attached to power circuit 2 (CKT 2) should be attached to a second 2-pole breaker such that the total load will be balanced. For model RA-28, two additional breakers are required for power circuits 3 and 4 (CKT 3 & 4).

Pre-Power Check

1. After all electrical connections have been made; every effort should be made to verify a safe installation. Verify that all connections in the unit and breaker panel are secure and that an adequate ground has been properly connected. Also verify that properly sized breakers have been installed keeping in mind that breakers that are too large are more dangerous than breakers that are too small.
2. Run water through the unit until air is purged.

Power Check

Check only after the Pre-Power Check has been completed and the unit filled with water. Turn on the Main Power Circuit Breakers. Verify that the heater's GREEN POWER-ON indicator light is illuminated.

Verify Voltage

Check the voltage available to each active power circuit. SEISCO models RA-9 to RA-28 are designed to operate from a 208V to 240V power supply. Connect a voltmeter at power circuit 1 (CKT 1) between L1 and L2. (For models with multiple power circuits utilized, continue to check voltage at each additional power circuit.)

Test Heater Operation

Turn water on MEDIUM-LOW utilizing any sink allowing water to run for a couple of minutes to ensure that all air is purged from the unit. You will hear a "click" as the relays on the circuit board engage. It is normal to hear a "hissing" or "crackling" noise from the heat exchanger after the unit is started. With the unit's cover removed, verify with an ammeter that there is ELECTRICAL CURRENT through each heating element circuit. DISREGARD THE WATER TEMPERATURE WHILE DOING THIS TEST.

Functional Checks

Beeps & Flashing Lights: It is normal at start-up or any time the heater is powered-on for the circuit board to beep and the LED to flash red and then green. Normal status of the heater is for the control to flash all green repeatedly. The initial 2 to 4 red flashes and beeps after power-on are normal, but should not continue.

SEISCO Provides On-Board Self Diagnostics

The heater's control provides self diagnostics by emitting a red flashing code. The code definitions and possible solutions can be found in the *Troubleshooting* section of the *SEISCO Installation & Service Guide*.

The most common problems discovered during installation and initial start-up:

- Circuit breakers are not turned-on (especially in heaters with multiple circuits)
- Incoming power wires to the heater are out-of-phase (heaters with multiple circuits)
- Water supply valve not turned-on, no water in the heater chamber
- Water supply lines are reversed; hot and cold reversed
- Water supply connection(s) are leaking
- T&P Relief Valve (where required by local code) is leaking or stuck open

Built in Leak Detection

The SEISCO heater has a **built in alarm** that will sound if there is water leaking onto the heater. It is **important to turn off all of the circuit breakers** to the heater whenever a leak is detected to prevent damage to the circuit board. After the leak is discovered and repaired, it is **important to dry any moisture or water accumulation** on the heater. This can be done with a standard household hair dryer compressed air or dry towel. Any attempts to dry the heater should be done with all the power off to the heater.

WARNING: If the circuit board becomes wet while in operation, it should be replaced as soon as possible. Water will corrode the traces and result in the short circuits which can ultimately lead to catastrophic failure of the heater and damage to the surrounding area.

Sizing – Flow vs. Heater

When a SEISCO heater is selected, the model should be selected to match the flow rating and temperature rise specifications of the home's hot water fixtures. SEISCO heater specifications can be found in the chart below. With the patented power-sharing design of the SEISCO heater, we recommend always choosing a slightly larger heater when uncertain of the sizing as there is no energy penalty for over sizing the heater.

Gallons/Minute and First Hour Recovery (gpm & 1st Hour) @ Temperature Rise (F)

Model	Recovery	65	60	55	50	45	40	35	30	25	20	15
RA-5	gpm	0.53	0.56	0.62	0.68	0.76	0.85	.98	1.1	1.4	1.7	2.3
	gph	31.5	34.1	37.2	41.0	45.5	51.2	58.5	68.3	81.9	102.4	136.6
RA-7	gpm	0.74	0.81	0.88	1.0	1.1	1.2	1.4	1.6	1.9	2.4	3.2
	gph	44.1	47.8	52.1	57.4	63.7	71.7	81.9	95.6	114.7	143.4	191.2
RA-9	gpm	0.95	1.0	1.1	1.2	1.4	1.5	1.8	2.0	2.5	3.1	4.1
	gph	56.7	61.5	67.0	73.8	81.9	92.2	105.4	122.9	147.5	184.4	245.8
RA-11	gpm	1.2	1.3	1.4	1.5	1.7	1.9	2.1	2.5	3.0	3.8	5.0
	gph	69.3	75.1	81.9	90.1	100.2	112.7	128.8	150.2	180.3	225.3	300.5
RA-14	gpm	1.5	1.6	1.7	1.9	2.1	2.4	2.7	3.2	3.8	4.8	6.4
	gph	88.2	95.6	104.3	114.7	127.5	143.4	163.9	191.2	229.4	286.8	382.4
RA-16	gpm	1.7	1.8	2.0	2.2	2.4	2.7	3.1	3.6	4.4	5.5	7.3
	gph	100.9	109.3	119.2	131.1	145.7	163.9	187.3	218.5	262.2	327.8	437.0
RA-18	gpm	1.9	2.0	2.2	2.5	2.7	3.1	3.5	4.1	4.9	6.1	8.2
	gph	113.5	122.9	134.1	147.5	163.9	184.4	210.7	245.8	295.0	368.8	491.7
RA-22	gpm	2.3	2.5	2.7	3.0	3.3	3.8	4.3	5.0	6.0	7.5	10.0
	gph	138.7	150.2	163.9	180.3	200.3	225.3	257.5	300.5	360.6	450.7	600.9
RA-28	gpm	2.9	3.2	3.5	3.8	4.2	4.8	5.5	6.4	7.6	9.6	12.7
	gph	176.5	191.2	208.6	229.4	254.9	286.8	327.8	382.4	458.9	573.6	764.8
RA-32	gpm	3.4	3.6	3.9	4.4	4.8	5.5	6.2	7.3	8.7	10.9	14.6
	gph	201.7	218.5	238.4	262.2	291.4	327.8	374.6	437.0	524.4	655.6	874.1

Better Designs for High Flow Applications

Another oversight may be the lifestyle of the user. For instance, if the user wants to take two showers at the same time or run the washing machine and the bath tub at the same time, then the flow rate demands of the water heater are increased, sometimes beyond the capability of a single SEISCO heater. Multiple SEISCO heaters are used for higher flow applications, such as for multiple task lifestyles, whirlpool and Jacuzzi tubs and body spa showers as well. Refer to ***Product Applications and Diagrams*** section of this

manual for recommended multiple SEISCO heater arrangements. Note, it is **important to evaluate the electrical capacity** of the home or building when selecting multiple SEISCO heaters for a high flow application. Refer to the ***Electrical Service Requirements and Sample Load Calculations*** section in this manual.

Typical Flow *USE* Rates in Gallons per Minute (GPM)

Fixture Type	Lavatory	Bathtub	Shower	Kitchen	Pantry Sink	Laundry	Dishwasher
Flow Rates	0.8 – 1.5	2.0 – 4.0	1.5 – 3.0	1.0 – 1.5	1.5 – 2.5	2.5 – 3.0	2.0 – 3.0

Temperature Adjustment

After the SEISCO heater has been installed and the operational checks are completed, the output of the hot water can be measured and adjusted if necessary. The temperature adjusting knob can be found on the left side of the circuit board. The factory setting is usually between 117 and 120 degrees F. The knob will usually be in the 2 to 3 o'clock position. Turning the knob to the left decreases the temperature and turning it to the right increases the temperature. Note: it is important to understand the **effects of increasing the temperature** above the factory setting as follows:

- The heater will use more power to heat the water - energy savings are reduced.
- There will be a greater chance that the heater will produce scaling and sediment build-up.
- The heater may not have the power to achieve temperatures higher than factory settings.
- Safety - with higher temperatures, there will be a higher risk of scalding and personal injury.

II. SERVICE & TROUBLESHOOTING GUIDE

A. OVERVIEW

The SEISCO is as simple to service as it is revolutionary. The following guide has been prepared to provide a detailed summary of all the service procedures that may be utilized by the service technician.

Before using this technical guide you should remember that the proper operation of the SEISCO depends on a few simple guidelines:

1. The SEISCO must have proper voltage at each of its incoming power circuits. The top incoming circuit or the #1 circuit also provides power to the circuit board functions, including the LED status light.
2. The SEISCO has high temperature limit switches that will open when high temperature conditions have occurred and will prevent the heater from operating. So the high limit switches must be **closed (set)**.
3. The SEISCO has water level detect circuitry that will prevent the heater from turning on if the water level inside the heater is low. There must be water in the heater for it to operate.
4. There must be power **to and through** each element. Each power circuit requires the incoming power to pass through two relay devices, **the first is a solid state switch (TRIAC) and the second is a pair of electro-mechanical relays.** If either of these switches is defective then its respective heating element cannot be turned on.
5. The heating elements must be operational. If an element is bad the heater will not perform as designed.
6. The SEISCO control depends on the *temperature information* it *receives from each of the temperature sensors (3-5 number varying by model).* If any sensor or its wires providing connection to the control panel is bad, the temperature information the micro-control receives will be bad. The SEISCO may not turn on at all or if it does the temperature may fluctuate.
7. Finally, the control panel must be completely functional.

The information contained in the SEISCO SERVICE GUIDE will assist the technician in properly testing each these components and/or circuits.

B. SEISCO SAFETY AND DIAGNOSTIC FEATURES:

Self Diagnostics

When a problem is detected in the heater, diagnostic codes are signaled in red by the LED status light located on the control panel. Some codes automatically reset if the problem corrects itself, such as high or low voltages. Others have to be manually reset for safety reasons; such as low water level and high temperature detection.

At start-up, the four chamber heater will flash four red times with corresponding beeps (twice for the two chamber heater) then proceed to its normal green flashing status. When a problem is detected, the LED light will alternate a RED flashing diagnostic code. With the activation of the audible feature, the same code will beep so it can be heard by a service technician over the phone. The feature is activated by pressing the blue button of the circuit board.

Each diagnostic code consists of a 3 digit number. The LED will flash each of the three digits in order separated by a brief pause. The last digit will be followed by a green flash. If there are multiple codes they will follow in sequence then repeat. It is necessary to read all codes before determining corrective service to the heater. The diagnostic code will continue to repeat until the problem with the heater is corrected. A complete list of codes and their resolution can be found in the ***Troubleshooting and Self Diagnostic Code Tables*** of this section.

Color Coded Wiring

All wires, that are part of the heater, are color coded by component. For instance, the wires going to the **temperature sensors** and the **leak detector** are white. Brown wires connect to the **high temperature limit** switches. Yellow wires connect to the **low water level detectors** and the larger black and red wires are used for the heating elements.

A combination of colors may be used on the incoming power wires that attach to the circuit board lugs. These wires are generally installed by the electrician and are chosen according to the code requirements. For instance, it is possible that the incoming power wires could be white and black or red and black or all black, etc. Regardless of the colors and their sequence, it is recommended to always label these wires before a board removal so that the wires are kept in phase. Labeling with masking tape and a marker or pen is suggested (i.e. starting with the top incoming wire: L11, L21, L12, L22, L13, L23, L14, L24)

Labeled Circuit Board

SEISCO'S circuit board is labeled at each spade or connection point with the associated circuit wire. Used in conjunction with the color-coded wires, one can re-connect the circuits correctly when performing tests, troubleshooting or replacing the circuit board. Also, a complete wiring schematic is located on the inside of the removable protective cover.

Modular Design

The modular design of the SEISCO's heating chamber allows for easy replacement of parts. This feature also allows for the heater to be upgraded as new designs or features are introduced. New style parts can be installed with no other modifications to the basic heater.

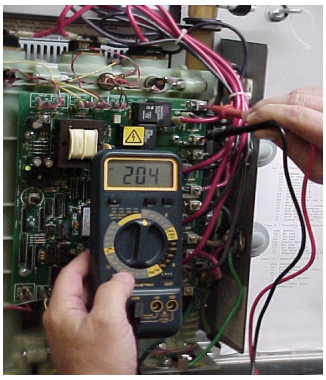
C. REQUIRED TEST EQUIPMENT

Because the SEISCO is powered by electricity, and has an electronic control system, it is necessary to have a battery powered volt/ohm multi-meter and a clamp-on amp meter for troubleshooting. It is necessary to have the proper tools and testing equipment before attempting to troubleshoot or service a SEISCO heater.

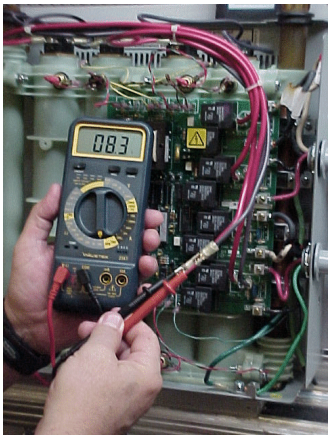
- A **multi-meter**; preferably with a digital read-out; capable of measuring AC (Alternating Current) voltage up to 600 volts. Also, the multi-meter should be capable of measuring resistance (or continuity) in ohms, up to 20K ohms (20,000 ohms).
- A **clamp-on ampere meter**; capable of measuring up to 200 amps. A deflection needle type or digital read-out amp meter is suitable. A deflection needle type may be easier to read due to the modulating characteristics of the SEISCO.
- A digital **thermometer**; capable of measuring water temperatures up to 180 degrees F.
- A **one gallon bucket** and stop watch (or **wrist watch**) for measuring flow rates.
- A set of basic hand tools, including a slotted screwdriver, a Phillips screwdriver, a pair of needle nose pliers, and a set of channel lock wrenches or channel lock pliers.
- For removal and replacement of SEISCO parts, it may be necessary to carry an element wrench, large and small Phillips screwdrivers, a set of box wrenches (or crescent wrenches), electrical tape, rags or towels and **heat sink compound**.
- A torque wrench and screwdriver, that measures inch/pounds, is recommended due to required torque specifications on all chamber body and circuit board components including temperature sensors, limit switches, level detects.

Remember, while it's important to know and understand the symptoms that have been described by the customer and the ability to verify diagnostic codes that may be present, **external issues must not be overlooked**. Often plumbing connections are reversed, or there may be leaks at the inlet or outlet connections, disconnected wires, turned-off or mislabeled circuit breakers, too high of a flow rate, etc. **KEEP IT SIMPLE** and refer to the basic ***Troubleshooting Check List*** later in this section.

D. TECHNIQUES FOR MEASUREMENT



Voltage measurements are taken, with the power on, at the circuit board lugs, to verify that all wiring is correct and that there is power to all the incoming circuits. The multi-meter should be dialed to AC volts, on the appropriate scale to enable a measurement reading up to 260 volts AC. The voltage across the incoming power lugs on the board is measured by placing each of the two multi-meter probes on the circuit board lugs labeled L1 & L2 for each circuit. (**Never measure from one lug to ground in an attempt to verify proper voltage at the circuit**). The voltage across the lugs should be between 200 and 250 volts AC. If voltage at any pair of lugs (L1 & L2) is zero, verify the circuit breakers then consult an electrician.



Ohm (resistance) measurements are taken, with the power OFF. Measurements are taken at the heating elements and the temperature sensors. Continuity checks can be done on the control wires, high limit switch, level detector circuit and leak detector circuit. Refer to ***Component Testing Table*** for details. The multi-meter should be dialed to ohms, on the appropriate scale to measure up to 20 ohms for the elements and on the appropriate scale to measure up to **20k** ohms for the temperature sensors. The two multi-meter probes need to be placed on both connection terminals of the device in order to correctly measure the resistance (ohms). Refer to the ***Component Testing Table*** for the normal ohm readings of the elements in the various SEISCO models. If no ohm reading or a decimal ohm value is read for any of these devices, then it is likely the device or its connecting control wire to the circuit board is open and needs to be corrected or replaced.

Amp (current) measurements are taken while all of the **POWER IS ON** and the heater is running to determine if power is getting through from the board to the elements. Also, this check may also help determine, and lead to further checking for, an open heating element, a disconnected element wire, flow rate exceeding the heater's capacity, or simply no power to the circuit being checked. The check is done by dialing the amp meter to read on the 100 amp scale. First the amp meter is clamped around a single red or black element wire traveling from the board to the element. With the heater running for a wide open flow, each heating element wire should read at or below the maximum amp rating of the circuit supply (See ***Component Testing Table*** (for ratings). If the reading is zero amps, then further checks should be done to determine that the incoming power wires are in phase, the circuit breaker is turned on, the power wires are tight at the lugs, the heating elements are good and the wires are tightly connected on top of the heating element. If it is determined as a result of these checks that there is no amp flow getting through from the board to one or more the heating elements, the circuit board could be malfunctioning and need replacing.

Run hot water at a faucet with normal flow and measure the amperage as described above. If the amperage is modulating (jumping up and down) within the same range on each element wire, then the flow rate is within the heater's capacity. If the amperage is steady and constant at the maximum amp rating for each element, then the flow rate may be exceeding the heater's capacity.

Flow rates can easily be measured at a faucet, **if necessary**, by using a common one-gallon bucket or a similar container of known liquid capacity. Flow rates of new vanity faucets and kitchen faucets are rated for 2.5 gallons per minute. Mop sink faucets are high flow fixtures and are rated at 4 GPM or greater. If in doubt, the approximate flow rate can be determined by simply turning on the faucet in question to full flow, and timing how long it takes to fill the one gallon bucket. If it takes 20 seconds to fill the one gallon bucket, then the flow rate is 3 gallons per minute or 3 GPM. If it takes 15 seconds to fill the bucket, then the flow rate is 4 GPM. Simply divide 60 seconds (which is one minute) by the recorded time to fill the bucket to arrive at the flow rate.

Temperature readings of the inlet and outlet water to the heater can be determined with a common cooking or baking thermometer. The inlet water temperature should be measured at the nearest faucet to the heater, by simply turning on the cold water (not the hot) and placing the thermometer into the flow. For best results, let the water run for approximately one to two minutes before taking the reading. This allows purging of any ambient temperature water sitting in the lines. Inlet water temperatures can vary depending on geographical location and the type of water system, to the building.

The outlet or hot water output temperature of the heater needs to be measured at a faucet downstream from the heater. Also, a reading should be taken at the outlet pipe above the heater to verify that there is no mixing of hot and cold at the faucet or in the plumbing between the heater and the faucet. The thermometer can be placed on the metal connection above the outlet fitting (not on the plastic outlet fitting itself) to obtain a reading, or simply feel the pipe to determine if the heater is producing hot water. If the outlet pipe of the heater is hot, but the faucet downstream from the heater is not producing hot water (provided enough time was allowed to purge the lines of standing cold water), then there may be the need to check the plumbing lines or the faucet for possible ratio adjustments, mixing or simply for incorrect line connections.

Temperature adjustments can be made at the heater using the adjustable thermostat knob that is located on the left side of the circuit board (the protective heater cover must be removed to expose the circuit board). Typically, the factory calibrates the setting to the 3 o'clock position to provide approximately 120 degree F output temperature.

Caution: For new construction, most local building codes require that the maximum domestic hot water temperatures do not exceed 120 degrees F, to reduce the risk of scalding. Due to these liability issues, it is recommended to leave the temperature at the factory setting.

Most dishwashers have heating coils to heat the water to an effective cleaning temperature. The soap used for dishwashers and washing machines is designed to kill the bacteria. Therefore, it is not recommended to turn up the SEISCO heater output temperature for dishwashers and washing machines.

Heaters used for domestic hot water, have a temperature range that can be adjusted with the thermostat knob from about 90 to 130 degree F. Turning the knob to the right (clockwise), increases the temperature output and turning the knob to the left (counterclockwise), decreases the output temperature of the heater.

IT'S IMPORTANT TO REMEMBER THAT TANKLESS WATER HEATERS PROVIDE A CONTINUOUS FLOW OF HOT WATER AT THE DESIRED TEMPERATURE. THERE IS NO REASON TO OVERHEAT THE WATER, WHICH CAN CAUSE MINERAL DEPOSITS IN ANY WATER HEATER, JUST SO THAT YOU CAN ADD COLD WATER TO COOL IT DOWN. TAKE ADVANTAGE OF THE BENEFITS OF YOUR SEISCO AND OPERATE IT AT A TEMPERATURE FOR YOUR NORMAL HOT WATER REQUIREMENTS.

E. TROUBLESHOOTING CHECKLIST

Most service calls will probably be for NO HOT water, FLUCTUATING TEMPERATURE or NOT ENOUGH HOT water. While most fall into these categories, there are other possible problems. **All too often the service technician gets ahead of himself, fixes the symptom but not the problem. This leads to call backs and very unhappy customers who lose confidence in the technician**. A simple and logical approach is to **always follow** the recommended ***Pre-Service, Troubleshooting Check List*** below. The checklist will be helpful in identifying the cause and possible solution to the problem. After performing this check list follow the comprehensive Troubleshooting solutions contained in the ***Component Testing and Troubleshooting Tables*** of this section.

- Verify the heater is properly mounted vertical on the wall or structure with the inlet and outlet fittings of the heater on the top, pointed toward the ceiling or upwards.
- Verify water flow through the heater. Make sure that any shut off valves to the heater (on the cold water inlet side) are in the open position to allow water to fill the heater.
- Verify that the heater is plumbed properly. The cold water pipe should be connected to the **right** inlet fitting and the hot water pipe connected to the **left** outlet fitting.
- Check the plumbing connections thoroughly and the heater for any **signs** of leaks.
- Verify a high flow rate fixture by using a 1 gallon bucket and watch. Determine if the flow rate matches the specifications of the SEISCO model selected for the application.
- With the POWER TURNED OFF (must be confirmed with a volt meter), check for any loose or disconnected control wires to the control panel or to the individual components of the heater. Also, verify the power wires connected to the circuit board lugs are tight. If stranded wire is used, check that all strands are in the lug. Any strands outside the lug may cause electrical shorts on the board with other components.
- Verify all appropriate circuit breakers are turned on and functioning properly.
- With the POWER TURNED ON, verify that there is power in all circuits connected to the heater. Check the power lugs on the circuit board to make sure there is 208 to 240 volts, AC across the lugs labeled L1 & L2 for each circuit.
- Check for any diagnostic codes. There may be more than one code. Refer to the ***Diagnostic Codes*** for interpretation of the diagnostic code(s).
- Check for a tripped high limit switch located at the top of the heating chamber. To identify, follow the brown wires from the circuit board to the switch. Turn off the power to the heater before resetting the switch. Note: Newer four chamber heaters will have an auto reset limit switch. Generally, this will be the 160 degree F switch located on the top right of the heater. The left limit switch has a manual reset.

- At the control panel, check the position of the thermostat knob setting. It may need to be adjusted to achieve the desired temperature. The normal setting is about 3 o'clock position (should provide about 120 degrees F). Turn clockwise to increase temperature, counterclockwise to lower the temperature.
- Check for malfunctioning faucets or incorrectly adjusted tempering, mixing or pressure sensitive valves downstream from the heater. This can be checked by feeling the outlet pipe on the left of the heater while the water is running. If it feels hot but the water at the faucet is cold, then check the plumbing at the faucets for possible adjustments or reversed lines.
- Check for the possibility of cold water lines that might be accidentally connected to the hot water lines downstream from the heater.
- Check for a non-functioning temperature sensor or heating element. See the following Component Testing and Troubleshooting Tables for detailed procedures.

F. CIRCUIT BOARD MATCHING PROCEDURE

This procedure enables the temperature sensors to be properly matched to the control's microprocessor. This process is required after replacing a circuit board and may be necessary after adjusting or replacing temperature sensors, temperature sensor wires or resetting a high limit switch.

- Turn off all circuit breakers to the SEISCO at the circuit breaker panel.
- Turn on a sink faucet (hot side) and let the water run until the water is cold. Let water continue to run.
- Locate the row of spade connections at the top, left hand corner of the circuit board on the SEISCO. The last pair of spade connections will have the word "Limit" above the connections with brown wires connected to the spades.
- Follow the left brown wire to the limit switch located above the left hand corner of the circuit board.
- Unplug the brown wire at the limit switch only, not at the board.
- Place the end of the wire away from the circuit board. DO NOT LET THE WIRE TOUCH THE CIRCUIT BOARD.
- Turn the power to the SEISCO on at the circuit breaker panel.
- The SEISCO will beep four times, and then pause. You will then get one audible beep, a pause, two beeps, a pause, and two beeps.
- After the beeping stops, find the blue reset button located approximately two inches below the blinking green and red status light.
- Push and hold the blue button for approximately 8-10 seconds, then release. You should hear a short, low tone buzz. If you do not hear this, repeat steps 9-10.
- Turn off all circuit breakers to the SEISCO at the circuit breaker panel.
- Turn off the water at the sink faucet.
- Reconnect the brown wire to the limit switch.
- Turn on all circuit breakers to the SEISCO. You will hear 4 beeps when the SEISCO turns on.
- Listen for the unit to "click". This takes up to 45 seconds.
- Turn on the hot water at a sink and test for water temperature.

* If no confirmation tone is received after 3 or 4 attempts, then check the temperature sensors and temperature sensor wires with the ohm meter. Go to the ***Component Testing Table*** for expected ohm readings.

G. COMPONENT TESTING TABLE FOR SEISCO® WATER HEATERS

Component	Type of Test	Power Status	Expected Results
Incoming Power Lugs (Circuit board)	Verify Power to Lugs – Voltage	On	Phase Check Measurements (Individual Circuit) L1 to L2 208 – 240 Volts (AC) L1 to Ground 110 – 120 Volts (AC) L2 to Ground 110 – 120 Volts (AC) Sequence Check Measurements (Circuit to Circuit) L1 to L1 0 Volts (AC) L2 to L2 0 Volts (AC)
Temperature sensors (Chamber)	Continuity – Ohms	Off	Ohm readings should be taken after the heater has been cooled down so that the temperature in the chamber is uniform. All temperature sensors should read within 25% of each other. For EXAMPLE, on an RA-28 with a 50 deg. F inlet water temp., the expected temperature sensor readings may read as follows: THIN ~ 15.24 Ohms TH1 ~ 15.02 Ohms TH2 ~ 15.55 Ohms TH3 ~ 15.21 Ohms TH4 ~ 15.81 Ohms Most temperature sensor readings will fall within 20.00 to 8.00 ohms, provided the heater is cooled down first.
High Temperature Limit Switch (Chamber)	Continuity – Ohms	Off	Should read –0- ohms If test shows open, press the reset button and retest

Component Testing Table for SEISCO® Water Heaters

Component	Type of Test	Power Status	Expected Results
Heating Element (Chamber)	Continuity – Ohms	Off	Read across screws at the Red & Black wires. Ohm readings should fall into the following range (also allow +/- 1% tolerance): 4500W ~ 12.5 to 13.5 Ohms 5500W ~ 9.5 to 10.5 Ohms 7000W ~ 7.5 to 8.5 Ohms
Heating Element (Circuit board)	Full Flow Test – Amps	On On	With the power on to all circuits, and water running at full flow at a sink or tub faucet, measure the amps on each Red or Black element wire, going from the circuit board to the element. Maximum expected readings as follows: RA-28 ~ 29 amps ea. RA-22 ~ 23 amps ea. RA-18 ~ 19 amps ea. RA-14 ~ 29 amps ea. RA-11 ~ 23 amps ea. RA-9 ~ 19 amps ea. Allow for +/-10% tolerance in readings due to meter error.
Heating Element (Circuit board)	Modulation Test – Amps	On	With power on and water at ½ (half) flow at the sink faucet, check amps at each element. Power should modulate and amp readings may fluctuate, but all should read approximately the same amps.
Level Detector Switch (Chamber)	Ohms	Off	Each contact should read -0- ohms to ground.
Moisture Detector Switch (Circuit board)	Ohms	Off	Should normally read open. If reading continuity, check for water leaks or water on the switch pad (mounted on the bottom of the base pan). Correct the leak or dry the switch and retest.

H. DIAGNOSTIC CODES FOR SEISCO® WATER HEATERS

READING THE CODES: The LED status light located on the control panel will flash **a three-part sequence** of red flashes, each representing one of three single numeric values. After each such sequence, the LED will momentarily reset and return to flashing green and then again return to flashing red the diagnostic code. Each part of the sequence begins with a red flash or flashes followed by a pause, then the next part of the three parts sequence and again a pause and finally the last part of the sequence. Count the number of red flashes in each sequence. For example, green flashing then one (1) red flash followed by a **pause**, (the is 1), then two (2) red flashes followed by a pause (this is 2), and finally four (4) red flashes followed by a pause (this is four), thus the code is 1-2-4, after which the LED status light will return to Green before beginning a new code sequence. REMEMBER THERE MAY BE MULTIPLE CODES SO VERIFY EACH SEQUENCE. If you wish to hear the audible alarm that corresponds to the red flashes, simply press the small blue mode button on the control panel for 2 seconds, after which it will beep a sequence of beeps corresponding to the flashing red sequence. This beep is particularly useful if you or the customer wants to allow someone to hear the code from a phone and assist.

Table of Diagnostic Codes for SEISCO® Water Heaters

Code	Probable Causes/ Conditions	Investigative & Corrective Action
111 112 113 114 115	Inlet Temperature sensor (TH-IN) Temperature sensor #1 (TH-1) Temperature sensor #2 (TH-2) Temperature sensor #3 (TH-3) Temperature sensor #4 (TH-4)	Codes 111 through 115 were designed to identify an individual temperature sensor with a problem. They will be associated with either a 117 or 118 code. Turn off all the power to the heater. Cool down the heater by running the water for approx. 5 minutes. Ohm the temperature sensor circuit, that was identified by the self diagnostic code, by placing the ohm meter at the white wire terminal connections on the circuit board. Compare the ohm reading to the ohm readings of the other temperature sensors. Refer to the ***Component Testing Table*** for expected readings. Check the red and green wires for continuity. As needed, replace any temperature sensors.
117	Not Used in current production (Shorted Temperature sensor)	The 117 code will appear with another temperature sensor code, such as 111, 112, 113, 114 or 115. This code was designed to indicate that there is a short in the temperature sensor or in the temperature sensor circuit identified. Check the red and green wires for continuity and refer to the same Corrective Action above for the temperature sensor code.

Table of Diagnostic Codes for SEISCO® Water Heaters

Code	Probable Causes/ Conditions	Investigative & Corrective Action
118	Open Temperature sensor	Typically, the 118 code will appear with another temperature sensor code, such as 111, 112, 113, 114 or 115. This code was designed to indicate that the temperature sensor circuit identified is open. Check the red and green wires for continuity and refer to the same Corrective Action above for the temperature sensor codes.
121	Disable Switch Open or Missing	The disable trace is cut, damaged or corroded on the circuit board. Refer to the ***Removal & Repair*** section to replace the circuit board. *__NOTE__* If the SEISCO model is indicated as "***SH"*** there may need to a "**jumper wire**" if the unit is not connected to an external relay used for "***PEAK***" and "***OFF PEAK***" regulation.
122	High Limit Switch Open/ Tripped	Check for a tripped high temp. limit switch. If tripped, 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. If the switch is open, see ***High Limit Switch Replacement*** in the ***Removal and Repair*** section. Replace the switch. If the switch is not open, check further for possible temperature sensor or temperature sensor wire problems. If a temperature sensor problem is found and corrected, perform the ***Matching Procedure***.
123	Water Level Detect Shutdown	123 code: Check that the heater is filled with water and that there is no air trapped inside, Purge the hot water lines if necessary. Check operation of back flow preventer (or check-valve). If the heater is filled and there are no leaks, ground both level detect spades on the board. The 123 code should go away. If so, do not leave the level detect grounded out as it will eliminate this very important safety feature. If code is accompanied with a clicking sound that is present only when water is running check the heating elements. Refer to the Component Testing Table. Call SEISCO for further assistance.

Table of Diagnostic Codes for SEISCO® Water Heaters

Code	Probable Causes/ Conditions	Investigative & Corrective Action
124	High Temperature Shutdown	The 124 code is triggered when the temperature of the water is more than 10 degrees higher than the set-point at **TH-4** or **THIN**. Refer to the ***Component Testing Table*** for expected readings. Typically, this occurs in two chamber heaters when the hot water is shut off abruptly and latent heat builds up in the chamber. Also, it may occur in a four chamber heater used in circulating systems and booster applications, because additional heated water is entering the chamber from the inlet side. This increases the chances of latent heat build-up when the water is abruptly shut-off. The 124 code should clear after the hot water clears the temperature sensors or the heater cools down. If the 124 doesn't clear and the heater doesn't turn on, call SEISCO for further assistance.
126	Moisture Detect (Water Leak)	Immediately shut off all power to the heater. Check for water leaking at the connections to the inlet and outlet fittings, the level detector screws, the limit switches, the elements and the temperature sensors. Tighten or replace leaking part or seal according to the specifications found in the Removal and Repair section of this manual. Using a hair dryer, dry down the board and the moisture detect sensor before turning on the power to the heater. If the code persists, turn off the power and use the hair dryer to dry the sensor again and recheck for leaks. If the heater is dry and no leaks can be found, the sensor could be shorted due to corrosion. As a temporarily measure, remove or disable the sensor by removing the two yellow wires from the circuit board. The 126 code should go away, but do not leave the heater in this configuration. Replace the sensor so as not to eliminate this important safety feature.
132	High Mains Voltage	Slightly higher voltage than nominally specified will not affect the performance. Sustained voltages higher than 10% above the nominal rating should be corrected so as not to damage the heater. Code will clear when voltage returns to nominal range.
133	Low Mains Voltage	Low voltage may reduce heating capacity of the heater. Sustained voltages below 20% of the nominal rating may cause the heater to shutdown. Code will clear when voltage returns to nominal range.

Table of Diagnostic Codes for SEISCO® Water Heaters

Code	Probable Causes/ Conditions	Investigative & Corrective Action
134 135 136 137	Element #1 Element #2 Element #3 Element #4	Codes 134 through 137 were established to signify which element has a problem.
	Breaker(s) at main panel or sub-panel	Check / reset breakers – most models have multiple power circuits (refer to heater specifications). Verify that the breakers marked for the heater are actually the breakers serving the heater.
	Incorrect wiring	With breakers on, check for power at the lugs. Refer to the ***Component Testing Table*** for proper voltage measurements at the lugs. It may be possible the electrical wiring is out-of phase to one or more of the incoming power circuits. Turn off all power to the heater and re-wire the circuits until all circuits are measuring 208 to 240 volts across each pair of lugs, L1 & L2. It is recommended that this be done by a licensed contractor.
	Loose connection	Turn off all breakers and check lugs and heating elements for loose or disconnected wires. If necessary, tighten or reconnect wires and turn on the breakers. Test water.
	Heater undersized for the application	Check water demands, including flow rate and inlet water temperature. Also, check the service voltage. If the service is 208 volts AC, and the heating elements are rated for 240 volts AC, the power rating and the flow rate capability of the heater will be decreased. Refer to the model ratings and flow rate specifications.
	Bad heating element	Turn off all power to the heater and test the heating elements. Refer to the ***Component Testing Table*** for expected ohm readings. If a heating element is bad, there will be no continuity or an infinite ohm reading (the meter may display “no reading” or “open”).
	Bad Temperature Sensor	Call SEISCO for further assistance.

Table of Diagnostic Codes for SEISCO® Water Heaters

Code	Probable Causes/ Conditions	Investigative & Corrective Action
142	Data Reading Error (A/D Converter Error)	The heater needs to be reset. Turn off all breakers to the heater for approx. Wait 30 seconds. Turn on breakers and check LED status. The LED should flash all green and heater should produce hot water. If the 142 code remains, try re-stetting the breakers again. If 142 code persists, refer to temperature sensor testing in the ***Component Testing Table***. If temperature sensors and wires are good, perform Matching Procedure. If the 142 code does not clear, see circuit board replacement in the ***Removal and Repair*** section.

Diagnostic codes are a useful tool for troubleshooting, however, SEISCO heaters can be diagnosed without the codes. Occasionally, a problem may occur that does not trigger a diagnostic code. If this happens, refer to the following ***Troubleshooting Table.*** Try to match the problem or symptom with the problem or symptom given in the table. Then work through the corrective action or procedure given in the Table.

All of the diagnostic codes can be found in the ***Diagnostic Code Table*** with corresponding corrective procedures. If the problem cannot be determined or solved by using this service guide, factory service personnel are available during normal working hours **(Monday-Friday, 8:30 – 5:30 PM Central Time) by calling: 888-296-9293**. Also consult the SEISCO website at www.seisco.com for an up to date list of authorized service centers.

Troubleshooting Table for SEISCO® Water Heaters

Symptoms /Codes	Probable Causes/ Conditions	Investigative/ Corrective Actions
No Hot Water & No Power to the heater Possible codes: None (LED not on)	Breaker(s) at main panel or sub-panel	Check / reset breakers – most models have multiple power circuits (refer to heater specifications). Verify that the breakers marked for the heater are actually the breakers serving the heater.
	No Voltage	Check for power at the lugs. Refer to the ***Component Testing Table*** for proper voltage measurements at the lugs.
	Incorrect wiring	If breakers are on and there is no power at the lugs, It may be possible the electrical wiring is out-of phase to one or more of the incoming power circuits. Turn off all power to the heater and re-wire the circuits until all circuits are measuring 208 to 240 volts across each pair of lugs, L1 & L2. It is recommended that this be done by a licensed contractor.
No Hot Water-Power verified at all incoming circuit lugs Possible codes: None 122 or 123 or 126 or 127 or 127 & 142 or 142	Check Self Diagnostic Codes, each listed in the Diagnostic Troubleshooting Code section	Check the LED on the circuit board for self diagnostic codes. If LED is flashing red code(s), refer to how to read the code, refer to ***Diagnostic Codes*** for possible causes and corrective action. If LED is solid red and there are two LED's, the circuit board is an older version analog control, made prior to May, 1999. The diagnostic codes do not apply to the analog control. Call SEISCO for troubleshooting procedure.
	Heater undersized for application	No code: Check water demands, including flow rate and inlet water temperature. Also, check the service voltage. If the service is 208 volts AC, and the heating elements are rated for 240 volts AC, the power rating and the flow rate capability of the heater will be decreased. Refer to the heater's ratings and flow rate specifications. Note: a 127 code may occur during periods of flow that exceed the heater capacity. If possible, throttle back the flow at the faucet or the shut-off valve. SEISCO heaters should be sized for maximum flow rate(s) and the highest temperature rise (which usually occurs in the winter months).

Troubleshooting Table for SEISCO® Water Heaters

Symptoms /Codes	Probable Causes/ Conditions	Investigative/ Corrective Actions
No Hot Water & Power verified at all incoming circuit lugs CONTINUED...	Tripped High Limit Switch	122 code: Check for a tripped high temp. limit switch. If tripped, 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. If the switch is open, replace the switch. If the switch is not open, check further for possible temperature sensor or temperature sensor wire problems.
122 or 123 or	No water or low water level in heater	123 code: Check that the heater is filled with water and that there is no air trapped inside. Purge the hot water lines if necessary. Check operation of back flow preventer (or check-valve). If the heater is filled and there are no leaks, ground both level detect spades on the board. The 123 code should go away. If so, do not leave the level detect grounded out as it will eliminate this very important safety feature. If code is accompanied with a clicking sound that is present only when water is running check the heating elements. Refer to the ***Component Testing Table.*** Call SEISCO for further assistance.
126 or	Water Leak	126 code: Check for water leaking at the connections to the inlet and outlet fittings, the level detector screws, the limit switches, the elements and the temperature sensors. With all power off to the heater, tighten or replace as necessary.
127 or 127 & 142 or 142	Power outage, voltage spike or surge	127 & 142 codes: The heater needs to be reset. Turn off all breakers to the heater for approx. 30 seconds. Turn on breakers and check LED status. The LED should flash all green and heater should produce hot water. If both codes remain, refer to temperature sensor and heating element testing. Perform the ***Matching Procedure***.

Troubleshooting Table for SEISCO® Water Heaters

Symptoms /Codes	Probable Causes/ Conditions	Investigative/ Corrective Actions
Water Not Hot Enough or Fluctuating Temps	Temperature sensor problem or bad temperature sensor wire or wire connection	127 & 142 codes: The following codes are also used by the control to identify the problem temperature sensor, (refer to the **Diagnostic Codes** for more detail): 111, 112, 113, 114, 115, 117 & 118 Turn off all breakers to heater. Allow heater to cool down by running cold water through the heater for approx. 5 minutes. Measure the ohms on each temperature sensor and wire by placing the ohm-meter probes on the circuit board where the white wires are connected to the spade terminals, (Refer to the **Component Testing Table** for expected values). If there is a low reading (5 ohms or less), see Temperature sensor Replacement in the **Removal and Repair** section. Perform the **Matching Procedure** after replacing the temperature sensor.
	Bad heating element	127 code: Turn off all power to the heater and ohm the heating elements. Refer to the **Component Testing Table** for expected ohm readings. If a heating element is bad, there will be no continuity or an infinite ohm reading (the meter may display “no reading” or “open”). See the **Removal and Repair** section for heating element replacement.
	Control Data Reading Error	142 code: The heater needs to be reset. Turn off all breakers to the heater for approx. 30 seconds. Turn on breakers and check LED status. The LED should flash all green and heater should produce hot water. If the 142 code remains, try re-stetting the breakers again. If 142 code persists, refer to temperature sensor testing in the **Component Testing Table**. If temperature sensors and wires are good, perform **Matching Procedure**. If the 142 code does not clear, see circuit board replacement in **Removal and Repair** section.

Troubleshooting Table for SEISCO® Water Heaters

Symptoms /Codes	Probable Causes/ Conditions	Investigative/ Corrective Actions
Water Not Hot Enough or Fluctuating Temps (Cont.) Possible codes are: None or 111 & 118 or 117 112 & 118 or 117 113 & 118 or 117 114 & 118 or 117 115 & 118 or 117 127 or 127 & 142	Breaker(s) at main panel or sub-panel	127 code: Check / reset breakers – most models have multiple power circuits (refer to heater specifications). Verify that the breakers marked for the heater are actually the breakers serving the heater.
	Incorrect wiring	127 code: With breakers on, check for power at the lugs. Refer to the ***Component Testing Table*** for proper voltage measurements at the lugs. It is possible the electrical wiring is out-of phase to one or more of the incoming power circuits. Turn off all power to the heater and re-wire the circuits until all circuits are measuring 208 to 240 volts across each pair of lugs, L1 & L2. It is recommended that this be done by a licensed contractor.
	Loose connection	127 code: Turn off all breakers and check lugs and heating elements for loose or disconnected wires. If necessary, tighten or reconnect wires and turn on the breakers. Test water.
	Temperature adjusted too low	No Code: Check the thermostat setting. If adjustable knob is turned all the way to the left, temperature output may be below 95 degrees F. Turn the knob to the right to increase temperature.
	Heater undersized for application	No code: Check water demands, including flow rate and inlet water temperature. Also, check the service voltage. If the service is 208 volts AC, and the heating elements are rated for 240 volts AC, the power rating and the flow rate capability of the heater will be decreased. Refer to the heater ratings and flow rate specifications. Note: a 127 code may occur during periods of flow that exceed the heater capacity.

Troubleshooting Table for SEISCO® Water Heaters

Symptoms /Codes	Probable Causes/ Conditions	Investigative/ Corrective Actions
Water Runs Hot and Then Cold Possible codes are: None or 124 or 127 & 142	Water lines reversed	127 & 142 codes: Turn on the hot water at a faucet. At the heater, if the outlet pipe (on the left) feels cold and the inlet pipe (on the right) feels hot or warm, then the water lines are reversed. Reconnect the water lines so that the hot water line is connected to the outlet fitting and the cold water line is connected to the inlet fitting. This may need to be done by a licensed contractor.
	High temperature shut-down	124 code: This code is triggered when the temperature of the water is more than 10 degrees higher than the set-point at **THIN** and **TH-4**. Refer to the ***Component Testing Table*** for expected readings. Typically, this occurs in two chamber heaters when the hot water is shut off abruptly and latent heat builds up in the chamber. Also, it may occur in a four chamber heater used in circulating systems and booster applications, because additional heated water is entering the chamber from the inlet side. This increases the chances of latent heat build-up when the water is abruptly shut-off. The 124 code should clear after the hot water clears the temperature sensors or the heater cools down. If the 124 doesn't clear or the heater does not turn on and the 124 code persists, call SEISCO for further assistance.
LED Stays on Solid Red	Analog circuit board	If the LED is solid red and there are two LED's, the circuit board is an older version analog control, made prior to May, 1999. The diagnostic codes do not apply to the analog control. Call SEISCO for troubleshooting procedure.
	Digital circuit board	Turn off all power to the heater and wait 30 seconds. Then turn on the power. If the LED remains solid red and doesn't flash, then see Replacing the Board in the ***Removal and Repair*** section. Replace the circuit board and perform the ***Matching Procedure***.

Troubleshooting Table for SEISCO® Water Heaters

Symptoms /Codes	Probable Causes/ Conditions	Investigative/ Corrective Actions
LED Does Not Come On	Breaker(s) at main panel or sub-panel	Check / reset breakers – most models have multiple power circuits (refer to heater specifications). Verify that the breakers marked for the heater are actually the breakers serving the heater.
	No Voltage	Check for power at the lugs. Refer to the ***Component Testing Table*** for proper voltage measurements at the lugs.
LED Does Not Come On (cont.)	Bad circuit board	Turn off all power to the heater and wait 30 seconds, then turn on the power. If the LED does not come on, see Replacing the Circuit board in the ***Removal and Repair section***. Replace the circuit board and perform the ***Matching Procedure***.
	Incorrect wiring	If breakers are on and there is no power at the lugs, it may be possible the electrical wiring is out of phase to one or more of the incoming power circuits. Turn off all power to the heater and re-wire the circuits until all circuits are measuring 208 to 240 volts across each pair of lugs, L1 & L2. It is recommended that this be done by a licensed contractor.
	Bad LED	With all the power on to the heater, and the water running full flow, take amp readings on each red or black heating element wire (refer to the ***Component Testing Table*** for expected amp readings). If there are amps measured through all the individual heating element wires, then the LED may be bad. Make sure the light is not being obscured by sun glare or a bright room. Also, activate the audible by removing one of the brown wires from the board and pressing the blue button. If the audible produces the 122 code, then the board is functioning properly. However, if the amp readings through the heating element wires are all zero, then see replacing the circuit board in the ***Removal and Repair*** section. Replace the circuit board and perform the ***Matching Procedure***.

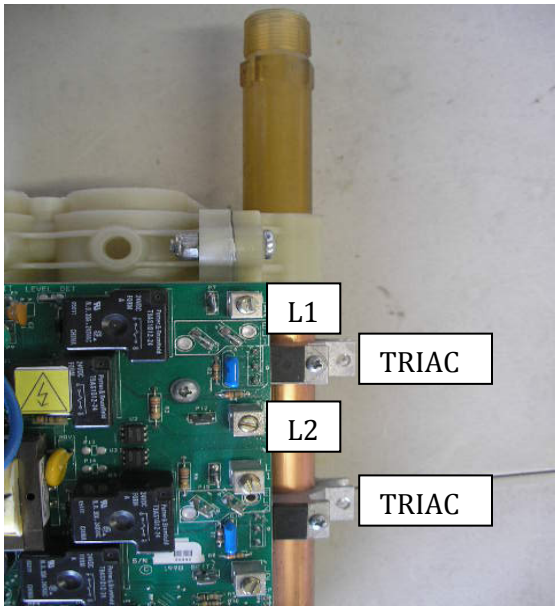
III. SEISCO® PARTS & SERVICE REMOVAL AND REPAIR GUIDE

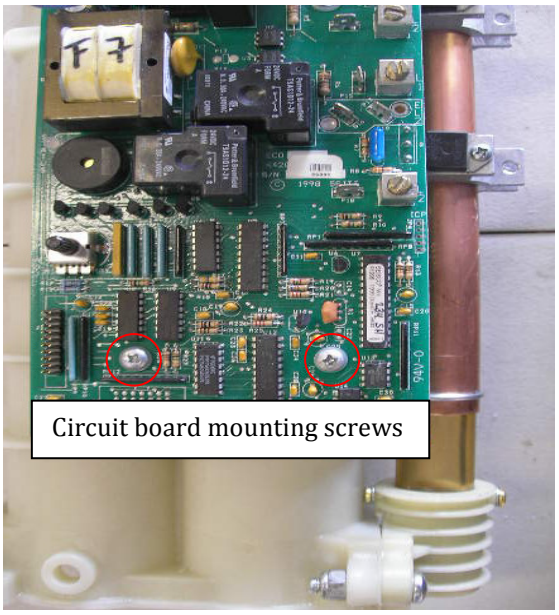
A. CHANGING THE CIRCUIT BOARD:

Required Tools: Needle nose pliers, Phillips and slotted screwdrivers, heat sink compound (or thermal grease) and a battery powered voltmeter.

WARNING: *To avoid electrical shock, make sure that all power to the heater is OFF before attempting to remove the old circuit board and while installing the new circuit board.*

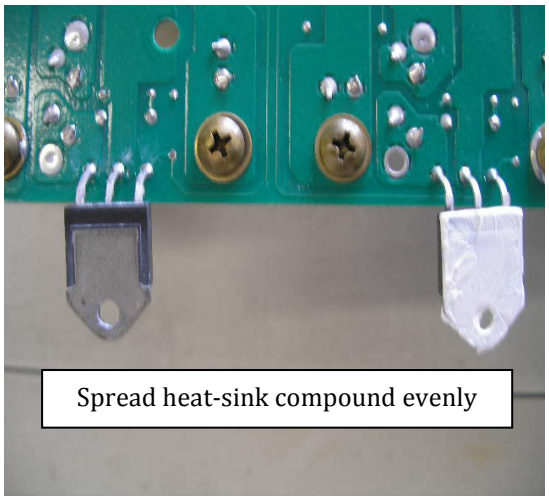
8. Turn off power to the heater. Confirm that power is OFF with a *voltmeter*, even if the status light (or LED) on the circuit board is off. There may be multiple breakers powering your model heater.
9. Label the incoming power wires to make replacement easier and to avoid re-installing them out of sequence. With a *slotted screwdriver,* loosen the screws and remove the power wires from the screw lugs on the right hand side of the board.
10. Using a pair of *needle-nose pliers,* gently wiggle and pull all of the control wires off the spades on the circuit board. Be sure to pull on the metal connectors and not the wire.
11. Using a *Phillips screwdriver,* unscrew the TRIACs from the heat sink to the right of the board. Retain the screws as they will be needed for the new board.
12. Using a *Phillips screwdriver*, remove the four mounting screws from the board; be ready to support the board as you remove the screws. Being careful not to get the white heat sink compound on your clothing, as it is difficult to remove.
13. Prepare the replacement board by cleaning the back of each TRIAC with alcohol then spreading a thin layer of heat sink compound covering the entire back of each TRIAC. This is critical to proper heat transfer and longevity of the replacement board.
14. Hand-tighten the board to the heater with at least two Phillips screws.
15. Install each screw through each TRIAC into to the heat sink being sure they are flat against the heat sink and being careful to properly align the threads. If you feel any resistance, back the





screw out and try again.

16. After the TRIACs are snug, tighten down the board screws (8 in.-lbs.). **CAUTION:** *Avoid over tightening the mounting screws.*
17. Replace the main power wires into the screw lugs and tighten. If the wires are stranded, make sure all strands are captured in the lug to avoid short circuits.
18. Replace the control wires removed in step 3 (refer to schematic inside the unit cover).
19. Follow the "Matching Procedure" detailed in the previous chapter to match the control to the thermistor values, and place the heater back in service.



B. REPLACING A HEATING ELEMENT:

Required Tools: Phillips screwdriver, 1 ½ inch element wrench or adjustable wrench, bucket, rag, hair dryer or compressed air, and a battery powered voltmeter.

WARNING: *To avoid electrical shock, make sure that all of the power is off to the heater before attempting to remove the old heating element and while installing the new heating element.*

1. Turn off all the power to the heater. Confirm the power is off with a *voltmeter*, even if the status light (or LED) on the circuit board is off. There may be multiple breakers powering your model heater.
2. Open a hot water faucet nearby. While the water is running, turn off the water supply to the heater. This will help drain some of the water out of the heater..
3. Using a *large Phillips screwdriver*, remove the six screws from the bottom; clean out (access) plate on the underside of the heating chamber to drain the remaining water from the heater into a *bucket*. Clean the seals and replace the plate.
4. Using a *Phillips screwdriver*, remove the two screws holding the red and black wires to the top of the heating element.
5. Use the *element wrench* to loosen the heating element. Wrap a rag around the heating element to prevent water from dripping onto the circuit board. Remove the heating element and the o-ring seal from the heater.
6. Make sure the new o-ring seal is in position on the replacement heating element and install the assembly into the heater. Tighten the element until snug (not more than 6 ft-lbs.).
7. Replace the red and black wires back onto the top of the heating element with the two Phillips head screws.
8. Make sure the hex head drain plug screw is tight and turn on the water supply to the heater. Check for leaks around the heating element and drain plug.
9. If any water dripped onto the circuit board, use a *hair dryer or compressed air* to dry the board and the rest of the heater. Make sure to dry behind the board as well.
10. Fill the heater with water. If there are no water leaks, restore power to the heater.

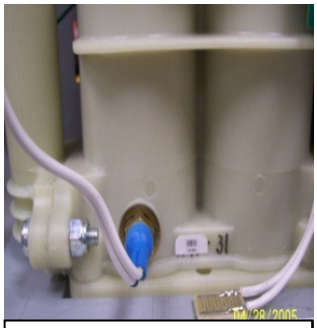
Heating Element: 1" screw flange, 12" long

Installed Heating Element

Note: If the heater sounds an alarm and a 126 diagnostic code appears, turn the power off, check for leaks again and dry the entire heater thoroughly. The alarm means that moisture was detected and the control disabled the heater.

C. THERMISTOR REPLACEMENT:

Required Tools: Small open ended box wrench, deep socket wrench or crescent wrench, needle nose pliers, battery powered volt meter, bucket.



Thermistor TH4

WARNING: *To avoid electrical shock, make sure that all of the power to the heater is OFF before attempting to remove the old thermistor and while installing the new thermistor.*

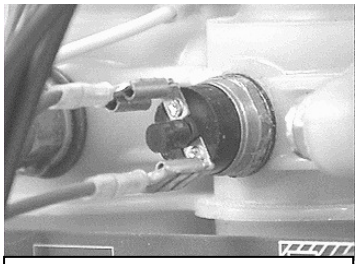
1. The TH-IN thermistor is located under the right side of the heater directly below the inlet fill tube. TH1 and TH3 are located near the top of chambers 2 and 4. TH2 and TH4 are located near the bottom of chambers 2 and 4.
2. Turn off all power to the heater. Confirm the power is off with a *voltmeter*, even if the status light (or LED) on the circuit board is off. There may be multiple breakers powering your model heater.
3. Open a hot water faucet nearby. While the water is running, turn off the water supply to the heater. This will help drain some of the water out of the heater.
4. For TH1, TH2, TH3, TH4 and THIN, remove the white wires with *needle nose pliers* from the circuit board.
5. Using a *large Phillips screwdriver*, remove the six screws from the right bottom clean out plate on the underside of the heating chamber to drain the remaining water from the heater into a *bucket* if no *drain pan* is installed. If you are changing TH2 or THIN remove both plates. Clean the seal and replace the plate(s) after draining.
6. Next, remove the thermistor(s) in question with a ½" *socket wrench* or *box wrench.*
7. Install the new thermistor making sure a new seal is positioned around the collar of the thermistor.
8. Turn the thermistor clockwise by hand. Caution: Only use the wrench to make the thermistor snug and only tightened to 14 in.-lbs., which is a little past finger tight. Trust the seal to prevent leaking not the tightness.
9. Connect the white wires to the circuit board.
10. If any water dripped onto the circuit board, use a *hair dryer or compressed air* to dry the board and the rest of the heater.
11. Fill the heater with water. If there are no water leaks, restore power to the heater.

Note: If the heater sounds an alarm and a 126 diagnostic code appears, turn the power off, check for leaks again and dry the entire heater thoroughly. The alarm means that moisture was detected and the control disabled the heater.

D. HIGH LIMIT SWITCH REPLACEMENT:

There are two high limit switches located near the top of chambers 1 and 3 in line across with thermistors TH1 and TH3. There are two brown wires connected to each high limit switch.

1. Remove the two brown wires with *needle nose pliers* and use the same tools and procedure above that are described for THIN through TH4 thermistor replacement. Again, only tighten the high limit switch to 14 in.-lbs. (same tightening torque as the thermistors)



High limit switch, reset button shown in the center between the two connectors.

E. LEVEL SENSOR REPLACEMENT:

There are two level detector sensors (brass screws) that thread into the top of the heating chambers. They are located between cylinders 1 & 2 and cylinders 3 & 4. There is one yellow wire connected to each sensor and its other end to the top of the circuit board.

Required Tools: Hex Head screwdriver, battery powered volt meter, and rag.

WARNING: *To avoid electrical shock, make sure that all of the power is off to the heater before attempting to remove the old level detector and while installing the new level detector.*

1. Turn off all the power to the heater. Confirm the power is off with a *voltmeter*, even if the status light (or LED) on the circuit board is off. There may be multiple breakers powering your model heater.
2. Open a hot water faucet nearby. While the water is running, turn off the water supply to the heater. This will help drain some of the water out of the heater.
3. Remove the level detector screw with a *Phillips screwdriver*. Use the *rag* to catch any water that may drip from the hole left by the removed screw. Save the wire lug and yellow wire for the new or replacement level detector screw.
4. Install a new seal by threading it onto the new level detector screw. Install the wire lug and screw the new level detector assembly into the threaded chamber with the *Phillips screwdriver.* Do not over tighten, 8 inch-lbs. maximum torque. The seal will do the work.
5. Fill the heater with water. If there are no leaks, restore power to the heater.

F. INLET WATER NIPPLE REPLACEMENT:

The ¾ inch threaded inlet water nipple is located vertically on the right side of the heating chamber. It is attached to the heat sink, the inlet guide and lower inlet guide. It will be necessary to remove the circuit board.

Required Tools: Large & small Phillips screwdriver, battery powered volt meter, rag, bucket, two pipe wrenches, needle nose pliers, heat sink compound and Teflon tape pipe sealer.

WARNING: *To avoid electrical shock, make sure that all power to the heater is OFF before attempting to remove the old inlet nipple and while installing the new inlet nipple.*

1. Turn off all the power to the heater. Confirm the power is off with a *voltmeter*, even if the status light (or LED) on the circuit board is off. There may be multiple breakers powering your model heater.
2. Open a hot water faucet nearby. While the water is running, turn off the water supply to the heater. This will help drain some of the water out of the heater.
3. Using a *large Phillips screwdriver*, remove the six screws from the right bottom clean out plate on the underside of the heating chamber to drain the remaining water from the heater into a *bucket*. Replace the plate after draining.
4. Remove the circuit board according to section *"A. Changing the Circuit Board".*
5. Using *two pipe wrenches*, disconnect the incoming water line threaded onto the top of the inlet nipple. Use the *rag* to prevent any water dripping or spraying, which should be very little if any.
6. Rotate the heat sink by hand far enough to the right and left to allow access and loosening of the two set-screws using a *small Phillips screwdriver*. Use the holes through the right side of the metal frame to reach the set-screws with the screwdriver. It is not necessary to remove the set-screws. Only back them out approximately 3/16 of an inch.
7. Pull the inlet nipple tube straight up and out.
8. Insert the new inlet tube, with o-rings in place, down through the guide and carefully press it into the heat sink. Some rotating of the inlet tube may be necessary to guide it down.
9. After seating the inlet tube, tighten the set-screws. The tube should be free to rotate after turning the set-screws into the grooves. Do not over tighten the set-screws.
10. Wrap the *Teflon tape pipe sealer* around the threads of the inlet nipple and reconnect the incoming water line. Do not use Plumber's Putty or Pipe Dope on the threads of the inlet and outlet nipple connections. If using CPVC or PVC primer and glue, avoid contact of these substances with the heater's inlet and outlet nipples. These substances are highly corrosive and can damage the inlet and outlet nipples. Leaks may occur as a result and cause severe damage to the heater.
11. Turn on the water and check for leaks.
12. Re-install the circuit board and turn on the power to the heater.

G. OUTLET WATER NIPPLE REPLACEMENT:

The ¾ inch outlet water nipple is located is located vertically on the left side of the heating chamber. It is not necessary to remove the circuit board or the heater from the wall to replace the outlet nipple.

Required Tools: Phillips screwdrivers, battery powered volt meter, rag, bucket, two pipe wrenches, needle nose pliers and Teflon tape pipe sealer.

WARNING: *To avoid electrical shock, make sure that all of the power to the heater is off before attempting to remove the old outlet nipple and while installing the new outlet nipple.*

1. Turn off all the power to the heater. Confirm the power is off with a *voltmeter*, even if the status light (or LED) on the circuit board is off. There may be multiple breakers powering your model heater.
2. Open a hot water faucet nearby. While the water is running, turn off the water supply to the heater. This will help drain some of the water out of the heater.
3. Using a *large Phillips screwdriver*, remove the six screws from the right bottom clean out plate on the underside of the heating chamber (there is only one clean out plate on a two chamber heater) to drain the remaining water from the heater into a *bucket*. Replace the plate after draining.
4. Using *two pipe wrenches*, disconnect the outlet water line threaded onto the top of the outlet nipple. Use the *rag* to prevent any water dripping or spraying, which should be very little if any.
5. Remove the two set-screws at the top of the outlet tube that hold the outlet water nipple in place.
6. Slide the outlet nipple up and out of the unit.
7. After sliding the new outlet tube in place, tighten the set-screws. The tube should be free to rotate after turning the set-screws into the grooves. Do not over tighten the set-screws.
8. Wrap the ONLY *Teflon tape pipe sealer* around the threads of the outlet nipple and reconnect the outlet water line. *Do not use Plumber's Putty or Pipe Dope on the threads of the inlet and outlet nipple connections. If using CPVC or PVC primer and glue, avoid contact of these substances with the heater's inlet and outlet nipples. These substances are highly corrosive and can damage the inlet and outlet nipples. Leaks may occur as a result and cause severe damage to the heater.*
9. Before turning on the water, make sure the circuit board is covered and protected from any possible water leak or spray. Turn on the water and check for leaks.
10. If there are no leaks, remove the covering or protector from the circuit board and turn on the power to the heater.

H. INLET GUIDE SEAL REPLACEMENT:

The inlet guide seal is located on the inlet guide that fits over the upper inlet water tube. It will be necessary to remove the heater from the wall and the circuit board, in order to replace the seal and the inlet guide itself.

Required Tools: Large & small Phillips screwdrivers, battery powered volt meter, rag, bucket, two pipe wrenches, needle nose pliers, heat sink compound and Teflon tape pipe sealer.

WARNING: *To avoid electrical shock, make sure that all of the power to the heater is off before attempting to remove the old inlet guide seal and while installing the new seal.*

1. Turn off all the power to the heater. Confirm the power is off with a *voltmeter*, even if the status light (or LED) on the circuit board is off. There may be multiple breakers powering your model heater.
2. Open a hot water faucet nearby. While the water is running, turn off the water supply to the heater. This will help drain some of the water out of the heater.
3. Using a *large Phillips screwdriver*, remove the six screws from the right bottom clean out plate on the underside of the heating chamber to drain the remaining water from the heater into a *bucket*. Replace the plate after draining.
4. Remove the circuit board according to the procedure section *"A. Changing the Circuit Board".*
5. Using *two pipe wrenches*, disconnect the incoming and outgoing water lines threaded onto the top of the inlet and outlet nipples. Use the *rag* to catch any remaining water.
6. Pull the AC power wires out the right side of the metal base pan.
7. Remove the entire heater assembly from the wall by removing the 4 mounting screws.
8. Remove the four Phillips screws in the back of the assembly that hold the heating chamber to the metal base pan.
9. Remove the 2 small screws that hold the inlet guide to the top right of the chamber assembly.
10. Slide the inlet guide up the inlet tube to expose the seal. Be careful not to pull the pipe outward as it may damage the lower inlet port.
11. Note: If it is necessary at this point to remove the inlet guide for replacement, then loosen the 2 screws in the heat sink and remove the inlet tube to separate the inlet guide.
12. Replace the seal and re-assemble in the reverse order
13. Wrap the *Teflon tape pipe sealer* around the threads of the inlet and outlet nipples before reconnecting the incoming outgoing water lines. *Do not use Plumber's Putty or Pipe Dope on the threads of the inlet and outlet nipple connections. If using CPVC or PVC primer and glue, avoid contact of these substances with the heater's inlet and outlet nipples. These substances are highly corrosive and can damage the inlet and outlet nipples. Leaks may occur as a result and cause severe damage to the heater.*
14. Turn on the water and check for leaks.
15. Re-install the circuit board and turn on the power to the heater. Verify power to all circuits.

I. HEAT SINK REPLACEMENT:

The heat sink is a metallic bar (aluminum or copper) located to the right of the heating chamber and it covers part of the inlet tube. It will be necessary to remove the circuit board as it is attached to the heat sink.

Required Tools: Large & small Phillips screwdrivers, battery powered volt meter, rag, bucket, two pipe wrenches, needle nose pliers, heat sink compound and Teflon tape pipe sealer.

WARNING: *To avoid electrical shock, make sure that all of the power to the heater is off before attempting to remove the old heat sink and while installing the new heat sink.*

1. Turn off all the power to the heater. Confirm the power is off with a *voltmeter*, even if the status light (or LED) on the circuit board is off. There may be multiple breakers powering your model heater.
2. Open a hot water faucet nearby. While the water is running, turn off the water supply to the heater. This will help drain some of the water out of the heater.
3. Using a *large Phillips screwdriver*, remove the six screws from the right bottom clean out plate on the underside of the heating chamber (there is only one clean out plate on a two chamber heater) to drain the remaining water from the heater into a *bucket*. Replace the plate after draining.
4. Remove the circuit board according to the procedure section *"A. Changing the Circuit Board".*
5. Using *two pipe wrenches*, disconnect the incoming water line threaded onto the top of the inlet nipple. Use the *rag* to prevent any water dripping or spraying, which should be very little if any.
6. Remove the two screws from the top of the heat sink and the two screws from the bottom. This will require rotating the heat sink to gain access to the screws. There are holes in the right side of the metal casing for screwdriver access.
7. Slide the top inlet tube up and out of the heat sink. There are two o-ring seals on the inlet tube.
8. Slide the heat sink up and off the lower inlet adapter tube and remove the Heat sink t this point, if necessary, the lower inlet adapter tube can be removed for replacement.
9. Replace the heat sink and re-assemble in the reverse order
10. Wrap the *Teflon tape pipe sealer* around the threads of the inlet and outlet nipples before reconnecting the incoming outgoing water lines. *Do not use Plumber's Putty or Pipe Dope on the threads of the inlet and outlet nipple connections. If using CPVC or PVC primer and glue, avoid contact of these substances with the heater's inlet and outlet nipples. These substances are highly corrosive and can damage the inlet and outlet nipples. Leaks may occur as a result and cause severe damage to the heater.*
11. Turn on the water and check for leaks.
12. Re-install the circuit board and turn on the power to the heater. Make sure that all of the circuits are on to power the heater.

J. LOWER INLET ADAPTER REPLACEMENT:

The inlet guide seal is located on the inlet guide that fits over the upper inlet water tube. It will be necessary to remove the heater from the wall and the circuit board from the chamber, in order to replace the seal and the inlet guide itself.

Required Tools: Large & small Phillips screwdrivers, battery powered volt meter, rag, bucket, two pipe wrenches, needle nose pliers, heat sink compound and Teflon tape pipe sealer.

WARNING: *To avoid electrical shock, make sure that all of the power is off to the heater before attempting to remove the old inlet adapter and while installing the new adapter*.

1. Turn off all the power to the heater. Confirm the power is off with a *voltmeter*, even if the status light (or LED) on the circuit board is off. There may be multiple breakers powering your model heater.
2. Open a hot water faucet nearby. While the water is running, turn off the water supply to the heater. This will help drain some of the water out of the heater.
3. Using a *large Phillips screwdriver*, remove the six screws from the right bottom clean out plate on the underside of the heating chamber to drain the remaining water from the heater into a *bucket*. Replace the plate after draining.
4. Remove the circuit board according to the procedure section *"A. Changing the Circuit Board".*
5. Using *two pipe wrenches*, disconnect the incoming and outgoing water lines threaded onto the top of the inlet and outlet nipples. Use the *rag* to prevent any water dripping or spraying, which should be very little if any.
6. Back out the AC power wires through the right side of the metal base pan.
7. Remove the entire heater assembly from the wall by removing the 4 mounting screws.
8. Remove the four Phillips screws in the back of the assembly that hold the heating chamber to the metal base pan.
9. Remove the two screws that hold the lower inlet guide to the lower right of the chamber assembly.
10. Remove the two screws at the bottom of the heat sink and slide the lower inlet tube and lower inlet adapter down and remove.
11. Separate the adapter from the tube by removing the two screws from the lower inlet adapter. At this point, if necessary, replace the lower inlet seal.
12. Re-assemble in the reverse order.
13. Wrap the *Teflon tape pipe sealer* around the threads of the inlet and outlet nipples before reconnecting the incoming outgoing water lines. *Do not use Plumber's Putty or Pipe Dope on the threads of the inlet and outlet nipple connections. If using CPVC or PVC primer and glue, avoid contact of these substances with the heater's inlet and outlet nipples. These substances are highly corrosive and can damage the inlet and outlet nipples. Leaks may occur as a result and cause severe damage to the heater.*
14. Turn on the water and check for leaks.
15. Re-install the circuit board and turn on the power to the heater. Make sure that all of the circuits are on to power the heater.

K. OUTLET TUBE SEAL REPLACEMENT:

The outlet tube seal is located between the outlet tube connection and the left side of the heating chamber. It will be necessary to remove the heater from the wall.

Required Tools: Large & small Phillips screwdrivers, battery powered volt meter, rag, bucket, two pipe wrenches, needle nose pliers and Teflon tape pipe sealer.

WARNING: *To avoid electrical shock, make sure that the all of the power is off to the heater before attempting to remove the old outlet tube seal and while installing the new seal.*

1. Turn off all the power to the heater. Confirm the power is off with a *voltmeter*, even if the status light (or LED) on the circuit board is off. There may be multiple breakers powering your model heater.
2. Open a hot water faucet nearby. While the water is running, turn off the water supply to the heater. This will help drain some of the water out of the heater.
3. Using a *large Phillips screwdriver*, remove the six screws from the right bottom clean out plate on the underside of the heating chamber to drain the remaining water from the heater into a *bucket*. Replace the plate after draining.
4. Using *two pipe wrenches*, disconnect the inlet and outlet water lines threaded onto the top of the inlet and outlet nipples. Use the *rag* to prevent any water dripping or spraying, which should be very little if any.
5. Back out the AC power wires through the right side of the metal base pan.
6. Remove the entire heater assembly from the wall by removing the 4 mounting screws.
7. Remove the four Phillips screws in the back of the assembly that hold the heating chamber to the metal base pan.
8. Remove the four screws that hold the outlet tube to the left side of the chamber assembly, exposing the seal for replacement if necessary.
9. Re-assemble in the reverse order.
10. Wrap the *Teflon tape pipe sealer* around the threads of the inlet and outlet nipples before reconnecting the incoming outgoing water lines. *Do not use Plumber's Putty or Pipe Dope on the threads of the inlet and outlet nipple connections. If using CPVC or PVC primer and glue, avoid contact of these substances with the heater's inlet and outlet nipples. These substances are highly corrosive and can damage the inlet and outlet nipples. Leaks may occur as a result and cause severe damage to the heater.*
11. Turn on the water and check for leaks.

Turn on the power to the heater. Make sure that all of the circuits are on to power the heater.

L. LOWER PLATE / SEAL REPLACEMENT:

The lower clean-out plate(s) are located on the bottom of the chambers, secured by six Phillip head screws.

Required Tools: Large Phillips screwdriver, battery powered volt meter, and bucket.

WARNING: *To avoid electrical shock, make sure that all of the power is off to the heater before attempting to remove the old outlet tube seal and while installing the new seal.*

1. Turn off all the power to the heater. Confirm the power is off with a *voltmeter*, even if the status light (or LED) on the circuit board is off. There may be multiple breakers powering your model heater.
2. Open a hot water faucet nearby. While the water is running, turn off the water supply to the heater. This will help drain some of the water out of the heater.
3. Using a *large Phillips screwdriver*, remove the six screws from the bottom clean out plate(s) on the underside of the heating chambers to drain the remaining water from the heater into a *bucket*.
4. Replace the plate and / or seal.
5. Re-assemble in reverse order.
6. Turn on the water and check for leaks.
7. Turn on the power to the heater.

M. FOUR CHAMBER SEAL REPLACEMENT:

Before beginning, it would be advisable to check the four bolts that hold the two chamber halves together before attempting the replacement of the seal. If these bolts can be tightened to stop a leak, major replacement costs may be avoided. Also, the replacement of the inter chamber seal is seldom the correct approach, because it is more labor intensive and may be less cost effective than replacing the entire chamber body. Depending on the age of the unit, the purchase of a complete upgrade unit may be more cost effective for the end-user than the labor to refurbish an older heater.

It will be necessary to remove the entire heater from the wall and the circuit board from the chamber assembly.

Required Tools: Large & small Phillips screwdrivers, battery powered volt meter, rag, bucket, two pipe wrenches, needle nose pliers, heat sink compound and Teflon tape pipe sealer.

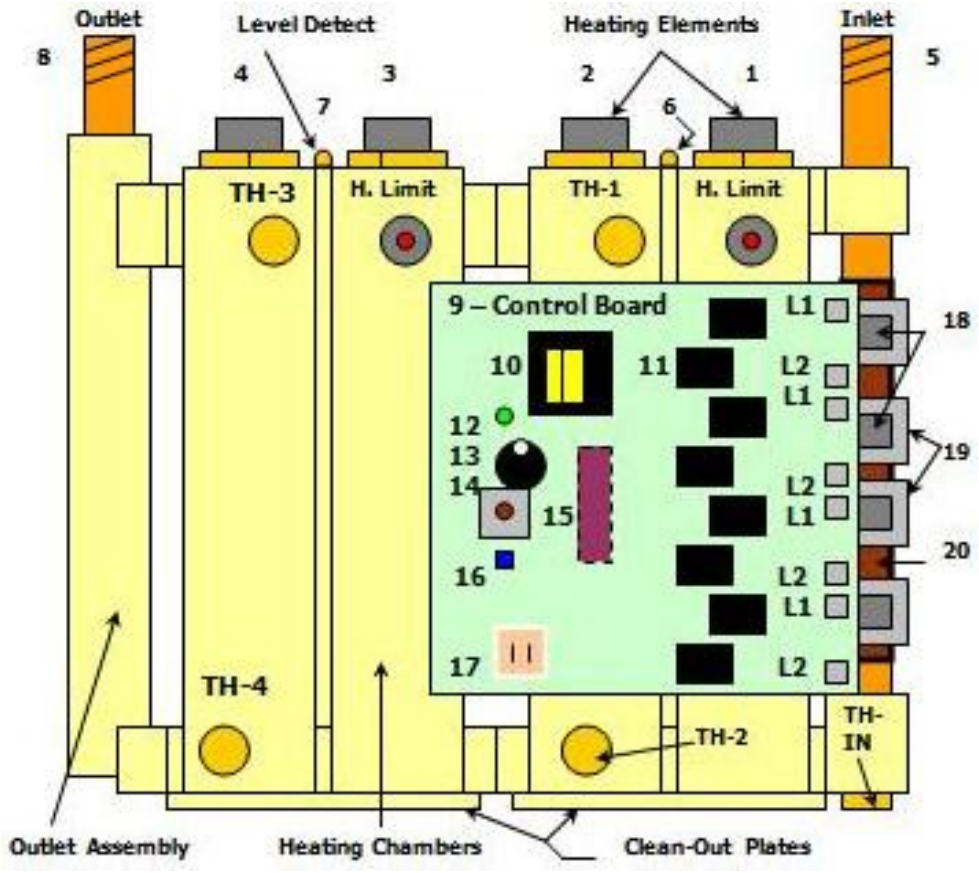
WARNING: To avoid electrical shock, make sure that the all of the power is off to the heater before attempting to remove the old chamber seal and while installing the new seal.

1. Turn off all the power to the heater. Confirm the power is off with a *voltmeter*, even if the status light (or LED) on the circuit board is off. There may be multiple breakers powering your model heater.
2. Open a hot water faucet nearby. While the water is running, turn off the water supply to the heater. This will help drain some of the water out of the heater.
3. Using a *large Phillips screwdriver*, remove the six screws from the bottom clean out plates on the underside of the heating chambers to drain the remaining water from the heater into a *bucket*.
4. Remove the circuit board following procedure in section "*A. Changing the Circuit Board"*
5. Using *two pipe wrenches*, disconnect the incoming water line threaded onto the top of the inlet nipple. Use a *rag* to catch any remaining water.
6. Pull the AC power wires through the right side of the metal base pan.
7. Remove the entire heater assembly from the wall by removing the 4 mounting screws.
8. Remove the four Phillips screws in the back of the assembly that hold the heating chamber to the metal base pan.
9. Remove the four bolts that hold the two chamber assemblies together and replace the inter seals.
10. At this point, if necessary, replace the right or the left chamber half. Make sure to use the removal procedures for the inlet tubes, guides, seals and adapters to reuse if replacing the right side chamber assembly. Remove the outlet tube and seal if replacing the left side chamber assembly.
11. Re-assemble in the reverse order.
12. Wrap the *Teflon tape pipe sealer* around the threads of the inlet and outlet nipples before reconnecting the incoming outgoing water lines. *Do not use Plumber's Putty or Pipe Dope on the threads of the inlet and outlet nipple connections. If using CPVC or PVC primer and glue, avoid contact of these substances with the heater's inlet and outlet nipples. These substances are highly corrosive and can damage the inlet and outlet nipples. Leaks may occur as a result and cause severe damage to the heater.*
13. Turn on the water and check for leaks.
14. Turn on the power to the heater.

15.

IV. APPENDIX A: INTERNAL WORKINGS AND PARTS IDENTIFICATION

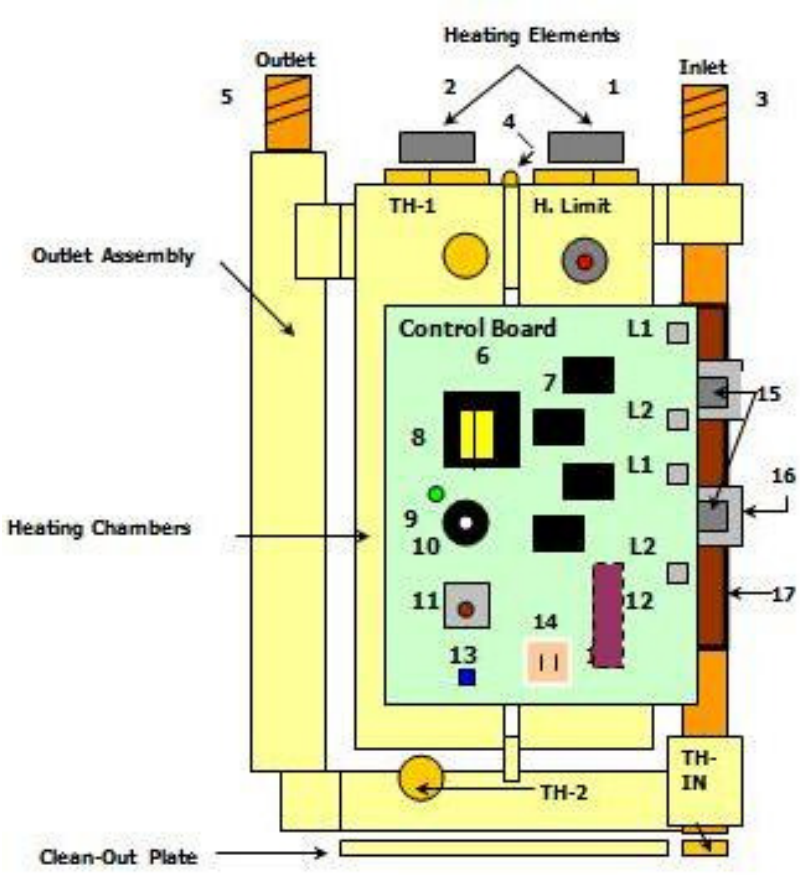
A. FOUR CHAMBER MODELS



LEGEND
1 – Heating Element #1
2 – Heating Element #2
3 – Heating Element #3
4 – Heating Element #4
5 – Inlet Water Tube, ¾ ”
6 – Water-Level Detect Screw
7 – Water-Level Detect Screw
8 – Outlet Water Tube, ¾ ”
9 – Printed Circuit Board
10 – Transformer
11 – Heating Element Relays (8 ea.)
12 – LED Light Indicator
13 – Audible Speaker
14 – Output Temperature Control

LEGEND
15 – Microprocessor Control Chip
16 - Blue Button; Manual Sound 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)
H. Limit: High-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

B. TWO CHAMBER MODELS



LEGEND
1 – Heating Element #1
2 – Heating Element #2
3 – Inlet Water Tube, ¾ ”
4 – Water-Level Detect Screw
5 – Outlet Water Tube, ¾ ”
6 – Printed Circuit Board
7 – Heating Element Relays (4)
8 – Transformer
9 – LED Light Indicator
10 – Audible Speaker
11 – Output Temperature Control
12 – Microprocessor Control Chip

LEGEND
13 – Blue Button; Manual Sound Activation
14 – Terminal Spades for Leak Detect Wires
15 – TRIACs (2)
16 – TRIAC Mounting Blocks to Heat Sink (2)
17 – Copper Heat Sink Tube
L1 – Power Connection Lugs (208 – 240 VAC)
L2 – Power Connection Lugs (208 – 240 VAC)

H. Limit : High Temperature Limit Switch
TH-IN : Inlet Temperature Sensor
TH-1 : Chamber Temperature Sensor #1
TH-2 : Chamber Temperature Sensor #2

V. APPENDIX B: SEISCO LIMITED WARRANTY

SEISCO International Limited, hereinafter referred to as **SEISCO**, warrants the tank and electronic circuit board of its residential water heaters against defects in materials and workmanship for three (3) years. Model numbers beginning with the letter "R" are classified as residential units. The tank as referred to herein shall mean the body of the heat exchanger only and does not include component parts attached to the body of the heat exchanger including but not limited to the heating elements, temperature sensors, pipe nipples, pressure relief valve, circuit board, TRIACs, and limit thermostat. These component parts are covered under the "Limited Parts Warranty". This warranty begins on the date of original retail purchase or, in the absence of proof of purchase verifying said date, from the date indicated by the serial plate affixed to the water heater; provided, however, that use of this water heater for commercial, institutional, industrial, or other non-residential purposes shall limit the maximum duration of this tank and electronic circuit board warranty to five (5) years from the date of original retail purchase.

In the event of a defect in materials or workmanship, **SEISCO** will repair or replace free of charge any tank part or circuit board found to be defective within a period of three (3) years from the date of original retail purchase. **SEISCO** reserves the right to use repaired or remanufactured parts and heaters when repair or replacement becomes necessary. During the first year of this warranty, **SEISCO** will pay reasonable and customary labor to install or replace any **tank part or circuit board** found to be defective in materials or workmanship. **(CIRCUIT BOARD OR TANK REPLACEMENTS TO THE ORIGINAL PURCHASER, MADE AFTER THREE (3) YEARS AND NOT LATER THAN TEN (10) YEARS FROM THE DATE OF THE ORIGINAL RETAIL PURCHASE WILL BE REPLACED BY SEISCO INTERNATIONAL) SUBJECT TO REPLACEMENT AND HANDLING CHARGES NOT TO EXCEED 15% OF THE MANUFACTURER'S SUGGESTED RETAIL PRICE OF THE UNIT MODEL FOR WHICH THE CIRCUIT BOARD OR TANK WAS ORIGINALLY INSTALLED, OR CURRENTLY SOLD COMPARABLE UNIT.** This warranty does not include the cost, it any, of any labor, or installation incurred more than 180 days following the purchase of this unit.

LIMITED PARTS WARRANTY

SEISCO warrants the other remaining component parts other than the tank and circuit board of the **SEISCO** heater to be free of defects in materials and workmanship for a period of one (1) year from the date of original retail purchase or, in the absence of proof of purchase verifying said date, from the date indicated on the serial plate affixed to the **SEISCO** heater. In the event that a part is defective, **SEISCO**, at its option will repair or replace the part free of charge for the part itself. **SEISCO** reserves the right to use repaired or remanufactured parts when replacement is necessary. During the first 180 days of this warranty, **SEISCO** will pay reasonable and customary labor on installation of any **SEISCO** part or component found to be defective in materials or workmanship. After the first 180 days following the purchase of this unit, no labor or installation, if any, are included in this warranty.

EXCLUSIONS AND LIMITATIONS OF THESE LIMITED WARRANTIES

THE LIMITED WARRANTIES PROVIDED HEREIN ARE IN LIEU OF ANY AND ALL WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND THE FITNESS FOR A PARTICULAR PURPOSE; PROVIDED, HOWEVER, THAT IMPLIED WARRANTIES ARE NOT DISCLAIMED DURING THE ONE YEAR PERIOD FROM THE DATE OF ORIGINAL RETAIL PURCHASE.

SEISCO SHALL HAVE NO LIABILITY HEREUNDER. EITHER DIRECT OR CONTINGENT, FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

This warranty gives you specific legal rights, and you may have other rights THAT vary from state to state.

These warranties shall be void and have no effect:

a) If the design or structure of the **SEISCO** heater is modified or altered in any way;
b) If appliances or equipment not approved by **SEISCO** are attached to the water heater;
c) If the water heater is not property installed in compliance with the latest issue of (1) the National Electric Code, (2) the applicable plumbing codes, (3) all local ordinances and regulations pertinent to similar water heaters, and (4) the installation guide and operational manual provided with the **SEISCO** water heater;
d) If the **SEISCO** water heater is not operated within the factory calibrated temperature limits;
e) If leaks in the tank or defects in other parts arise as the result of improper use, improper installation, negligence in operation (such as elements burned out in a dry tank, etc.), failures resulting from accident, or from inability of the **SEISCO** water heater or any parts to function because of improperly made replacements and repairs, or damage by fire, floods, lightning, or any other act of God;
f) If the **SEISCO** heater element or elements fail due to air entrapment;
g) If the serial plate has been altered or discarded and the purchase date cannot be verified with proof of purchase;
h) If the **SEISCO** heater is installed in any area where leakage of the tank or connections would result in damage to the area adjacent to the heater, or where such a location is unavoidable, a suitable drain pan was not installed under the water heater. When a drain pan must be used, the pan must meet all applicable plumbing codes and be at least 2 1/2” deep, extending not less than 1” above the unit's base plates, must protect an area at least 1-1/2” greater than the lower external dimensions of the heater, , and must be piped by 1" pipe to an adequate drain;
i) If the **SEISCO** heater or any of its components warranted herein are used other than as a part of the complete and integrated system as sold to the original purchaser;
j) If leaks in the tank or defects in other parts occur as a result of the **SEISCO** heater containing or being operated with de-ionized water;
k) If leaks in the tank or defects in other parts arise as a result of sizing that does not comply with the manufacturer's currently published sizing recommendations;

Replacements and/or repairs furnished under warranty carry only the unexpired portion of the original warranty.

The terms of this warranty may not be varied by any person, whether or not purporting to represent or act on behalf of **SEISCO.**

SEISCO SERVICE AND WARRANTY RECORD

Name: _____

Purchased From: _____

Date of Purchase: _____

Serial #: _____

Model #: _____

NOTES AND SERVICE RECORD: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

SEISCO® Tankless Water Heaters should be serviceable by most major brand authorized appliance repair centers in your area. If the preferred service center does not already have SEISCO service information, **SEISCO International Limited** will, upon request and with no charge, promptly fax the information to the service center. For information regarding service companies in your area, contact the original installer or **SEISCO** direct at 888-296-9293.