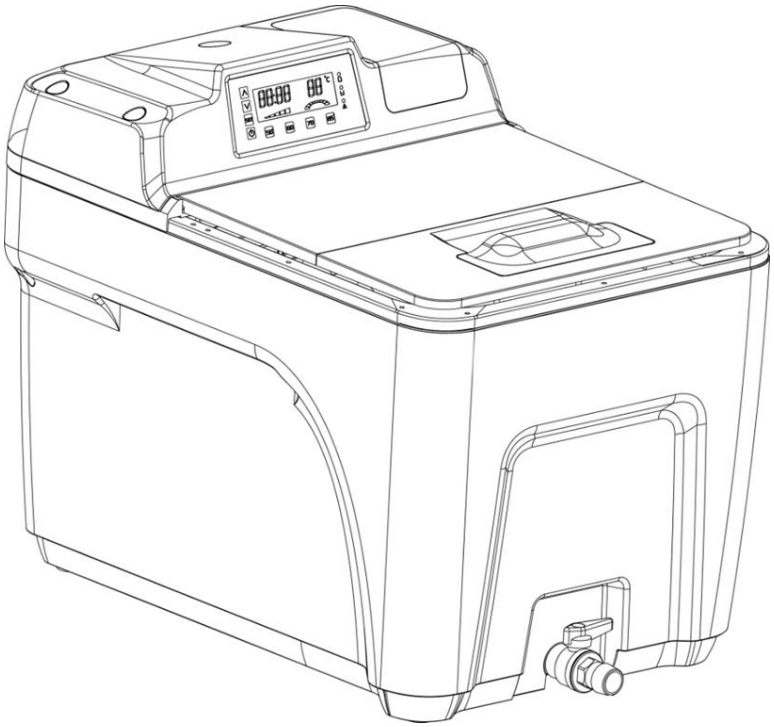
sca1200ht



Repair Manual

Oryx Additive Inc.

7755 S. Research Drive Ste. 120

Tempe, AZ 85284

1.833.817.3533

www.OryxAdditive.com

info@OryxAdditive.com

support@OryxAdditive.com

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ORYX

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Table of Contents

I. PRELIMINARY STEPS

Follow these steps before attempting to service the SCA

Power off and disconnect the SCA from the main power.

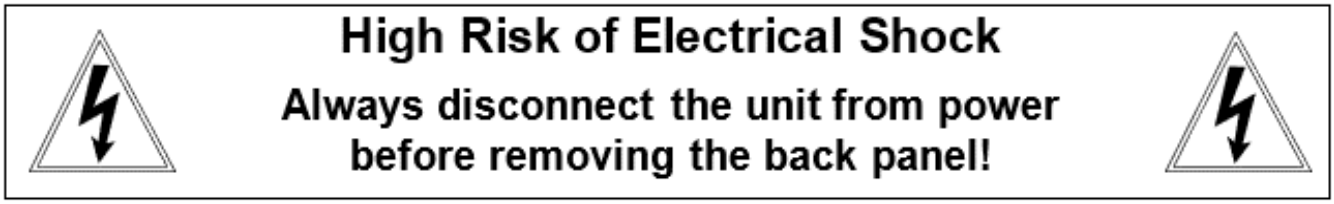
Allow the SCA to cool completely.

Attach a hose to the front valve and drain the tank completely.

Always disconnect the SCA from the main power and drain the tank completely before servicing.

II. QUICK TROUBLESHOOTING

The SCA has been designed to allow the end user to resolve most operating problems. When a problem is encountered, please read through this troubleshooting section below. The 1200ht Repair Manual can be found on our website at www.oryxadditive.com/products/sca1200ht. Please check if a newer version is available. If a resolution is not found, please contact Technical Support at support@oryxadditive.com or call 1.833.817.3533.



ALWAYS WEAR PROTECTIVE GLOVES AND EYEWEAR WHEN WORKING INSIDE THE TANK OR HANDLING COMPONENTS THAT ARE COVERED IN CLEANING SOLUTION.

NEVER PLACE YOUR FACE NEAR THE TANK WHEN REMOVING THE LID, VAPORS FROM THE CLEANING SOLUTION MAY CAUSE EYE AND RESPIRATORY IRRITATION.

Problem	Possible Causes	What to Do
No apparent power to the SCA	Power switch is not "On"	Press rocker switch on the right-hand side of the unit to the "I" position.
	Power cord is not connected to unit or wall	Check the power cord and make sure it is pushed all the way into the receptacle on the system and is securely connected to a grounded wall socket.
	F2 Fuse is blown	Possible Pump or PCB failure (**See No Power to SCA Troubleshooting Section XIII E).**
	Power circuit has tripped	Check your building circuit breakers for a tripped circuit breaker or blown fuse. Reset or replace the breaker or fuse as required.
	Power Switch has failed	Check the continuity of the Power Switch (**See No Power to SCA Troubleshooting Section XIII E**).
	Control Panel has a loose connection	Reseat J1, J2 and J3. Check for 12VDC from the PCB (**See How to the Reseat the Cable Connectors XII A**).
Pump and Heater will not start	Power is not on	Press rocker switch on the right-hand side of the unit to the "I" position.
	Start/Pause button not pressed	Press the Start/Pause button ⏻ on the Control Panel to enable the Pump and Heater.
	Timer has not been set and started	The system will only run when the Timer is counting down. Check the Timer display on the Control Panel. • If it is not counting down, press the Start/Pause button ⏻ . • If the time being displayed is 00:00, then add time and start the system.

Problem	Possible Causes	What to Do
Pump will not start	PCB Inverter Error, Defective PCB	Remove the back panel. Check if the red LED is lit constantly or flashing. If the LED is flashing (**See Pump and Transformer Troubleshooting Section XIII A**).
	Transformer is defective	Check the resistance of the Transformer (**See Pump and Transformer Troubleshooting Section XIII A**).
	Defective Pump	Check the resistance of the Pump and the mechanical rotation of the Pump Shaft (**See Pump and Transformer Troubleshooting Section XIII A**).
	Defective Run Capacitor	Check the capacitance of the Run Capacitor (**See Pump and Transformer Troubleshooting Section XIII A**).
	Control Panel has a loose connection	Reseat the Control Panel ribbon cable (**See Reseat the Connectors Section XII A**).
Pump starts but appears weak and ineffective	Clogged Inlet Strainer	Drain the SCA or remove the Pump (**See How to Remove the Pump Assembly Section IV A**). Remove the Pump Inlet Strainer at the bottom of the Pump (**See Pump and Transformer Troubleshooting Section XIII A)** and inspect for buildup at the impeller. Clean out any debris that will hamper the flow of the water through the Pump.
	Clogged Nozzle	Remove the Nozzle from the pump (**See How to Replace the Nozzle Section VI A**). Remove any buildup and clean out the holes in the Nozzle
	Bath water saturated with support material	When the bath water becomes saturated with support material, the water is denser than normal. This saturation of the water restricts the flow of the water from the pump and may appear that the pump is not functioning optimally. Drain the tank and add fresh water and cleaning solution as described in the "**Operating your SCA**" portion of the User Manual.
	Run Capacitor is defective	The Run Capacitor provides half the voltage to the pump and gives the pump an initial punch to allow the pump to run and turn in the proper direction. If the Run Capacitor is defective, the pump may or may not turn on. If it does turn on, it will only receive half of the input voltage and therefore will only run at half speed. Check the capacitance of the Run Capacitor (**See Pump and Transformer Troubleshooting Section XIII A**).
Heater will not start	Heater Element is defective	If the water is not heating at all, check the resistance of the Heater Element (**See Heating Element Troubleshooting Section XIII B**).
	Thermal Cutoff Switch (TCO) tripped or defective	If the water is not heating at all, check the resistance of the TCO. Reset the TCO (**See Heating Element Troubleshooting Section XIII B**).
	F1 Fuse blown	If the water is not heating at all, check the continuity of F1 (**See Heating Element Troubleshooting Section XIII B**).
	Control Panel has a loose connection.	Reseat the Control Panel ribbon cable (**See How to the Reseat the Cable Connectors XII A**).
	PCB is defective	Check the AC Voltage to the Heater Element. Check the Heater Element Control Signal (**See Heating Element Troubleshooting Section XIII B).**

Problem	Possible Causes	What to Do
Bath heats up but does not reach the Set Temperature or takes a long time to reach the Set Temperature	Heater Element is defective	Check the resistance of the Heater Element (**See Heating Element Troubleshooting Section XIII B**).
	Temperature Sensor defective	The Control Panel detects the current temperature of the bath through the Temperature Sensor and displays it on the panel. The bath should heat up 3 minutes per degree to the Set Temperature. If it takes longer to heat up or never reaches the Set Temperature, check the resistance of the Temperature Sensor (**See Temperature Sensor Troubleshooting Section XIII C**).
	Control Panel is defective	Check the voltage to the Heater Element (**See Heating Element Troubleshooting Section XIII B**). If the input voltage to the Heater Element is not present and the Temperature Sensor resistance is correct, the Control Panel may be defective.
	PCB is defective	Check the AC Voltage to the Heater Element (**See Heating Element Troubleshooting Section XIII B**). If the voltage is not correct, replace the PCB.
Alarm is sounding, Warning Indicator flashing: Water Level Indicator flashing	Liquid level is too high or too low High Water Low Water Indicator Flashing	Check the indicator lights on the right side of the control panel. If either level indicator is on, add or remove water from the tank until the indicators turn off. **ALWAYS WEAR PROTECTIVE GLOVES AND EYEWEAR WHEN ADDING OR REMOVING LIQUID FROM THE TANK.**
Alarm is sounding Error Code Displayed: EO = Over Temperature **What It Means:** The temperature of the bath has been detected to exceed 5°C over the Set Temperature	Exothermic Reaction from Sodium Hydroxide	Sodium Hydroxide (WaterWorks) creates an Exothermic Reaction (heating effect) when introduced to water. Sodium Hydroxide should only be added to bath water below 50°C. Adding Sodium Hydroxide to hot water can cause heated water to increase temperature quickly and may result in an EO Error if the bath is currently at the Set Temperature. This can also cause a dangerous spattering effect. **DO NOT ADD SODIUM HYDROXIDE TO HOT WATER.** Open the lid and lift the part basket from the tank. Let the liquid return to its set temperature. **ALWAYS WEAR PROTECTIVE GLOVES AND EYEWEAR WHEN ADDING SOLUBLE CONCENTRATES OR MANIPULATING THE PART BASKET. NEVER PLACE YOUR FACE NEAR THE TANK WHEN REMOVING THE LID, VAPORS FROM THE CLEANING SOLUTION MAY CAUSE EYE AND RESPIRATORY IRRITATION.**
	Defective Temperature Sensor	If the error occurs again, check the resistance of the Temperature Sensor (**See Temperature Sensor Troubleshooting Section XIII C**).
	Defective Control Panel	If the Temperature Sensor resistance is correct, the water temperature can be measured using a thermometer. If the water is cooler, as measured with the thermometer, than is displayed on the Control Panel, the Control Panel may be defective.
	Defective PCB	The Heater Relay may get stuck closed causing constant voltage to the Heater Element. The voltage to the Heater Element should be disabled when the temperature of the bath reaches 1°C above the Set Temperature. If there is constant voltage to the Heater Element (**See Heating Element Troubleshooting Section XIII B)** when the temperature of the bath exceeds 2°C above the Set Temperature, the PCB may be defective.

III. REMOVING TOP COVER AND BACK PANEL

A. How to Remove the Top Cover

1. **Remove the Top Cover**
   a. Unplug the SCA from power and pry out the rubber plugs from the Top Cover (***See Figure 1***).
   b. Remove the six M5 Phillips head screws holding the Top Cover.

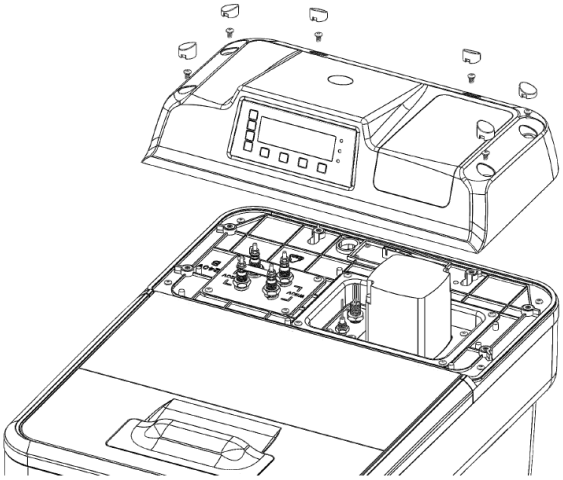


Figure 1 – Removing Plugs and Screws

   c. Carefully lift the cover from the SCA and disconnect the Control Panel ribbon cable from the Connector PCB (***See Figure 2***). There is a latch in the middle of the ribbon cable (**See <u>How to the Reseat the Cable Connectors</u> Section XII**).

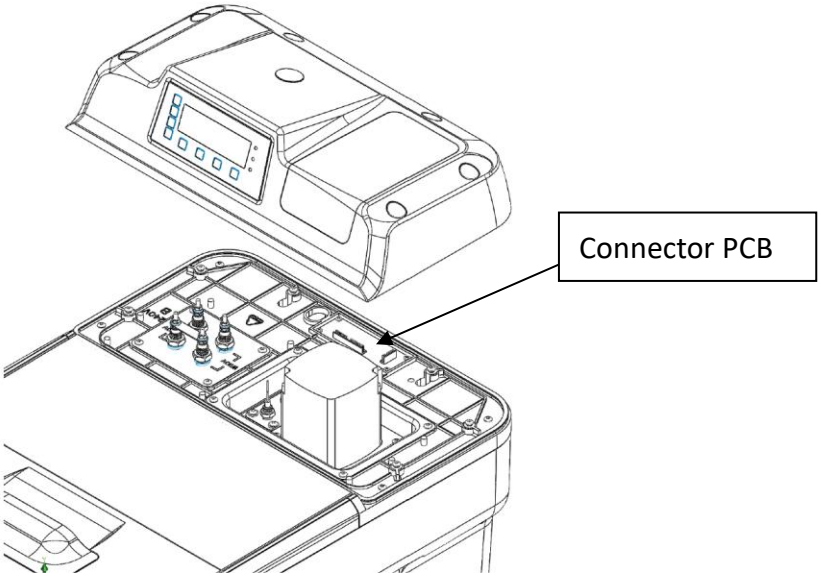


Figure 2 – Remove Top Cover

B. How to Remove the Back Panel

1. **Remove the Back Panel**
   a. Unplug the SCA from power and remove the two M5 screws holding the Back Panel.
   b. Pull down on the Back Panel and remove (***See Figure 3***).

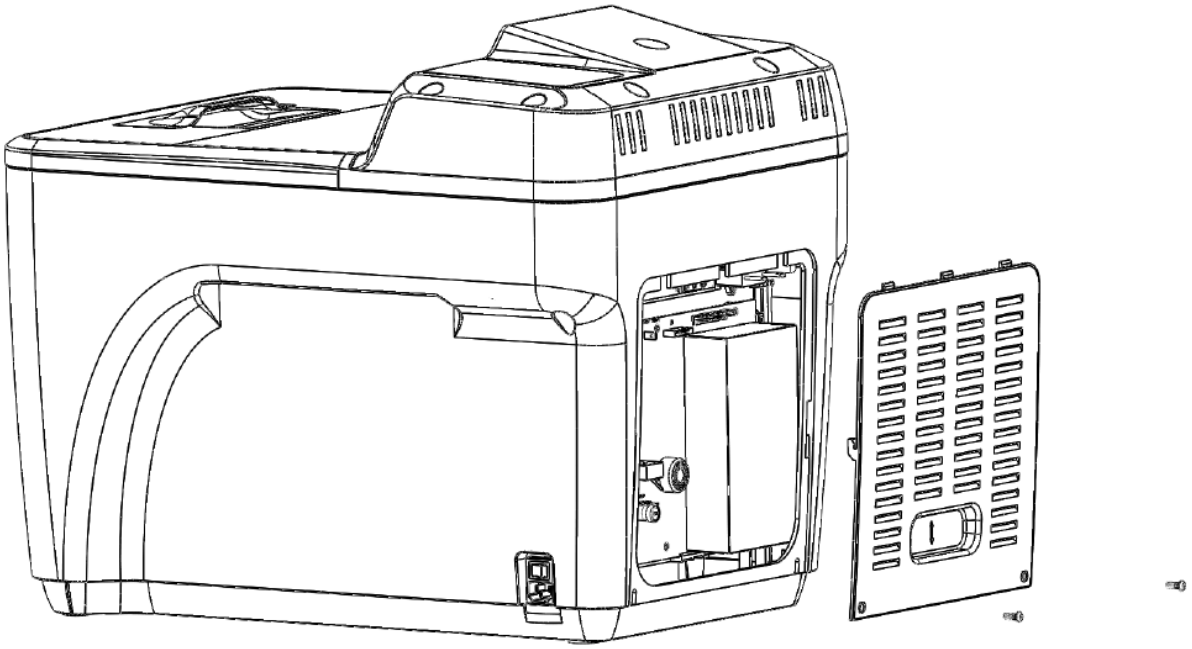


Figure 3 – Remove Back Panel

IV. PUMP ASSEMBLY REPLACEMENT

A. How to Remove the Pump Assembly

1. **Remove The Top Cover**
   a. Unplug the SCA from power and remove the Top Cover (**See How to Remove the Top Cover Section III A**).
2. **Remove the Back Panel**
   a. Remove the Back Panel (**See How to Remove the Back Panel Section III B**).
3. **Remove the Wire Connections**
   a. Disconnect the Pump Motor connector from the PCB Assembly.

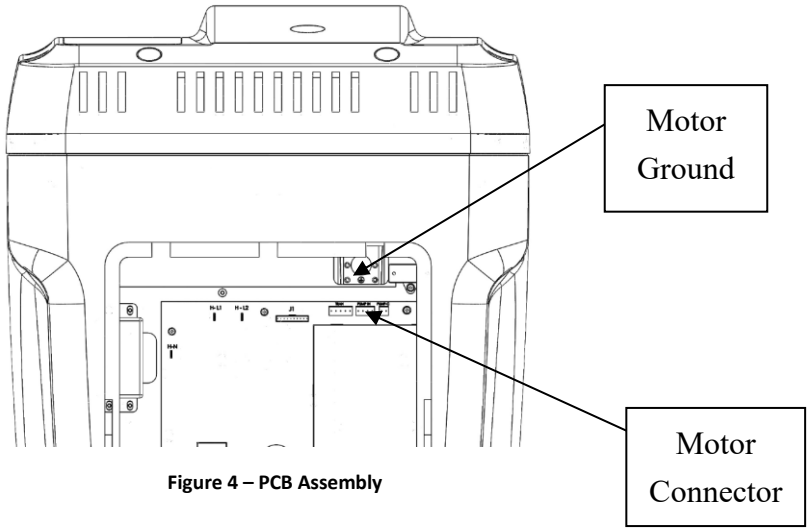


Figure 4 – PCB Assembly

   b. Remove the screw holding the Pump Motor ground wire.
   c. Gently pull the motor wires through the hole in the Bridge Cover.

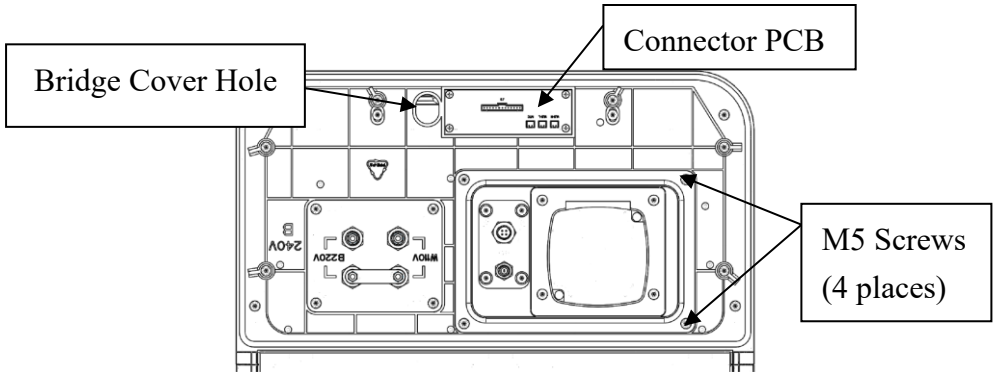


Figure 5 – Top View of SCA with Top Cover Removed

   d. Unplug the three white 2-wire connectors for the sensors that connect to the Connector PCB.
4. **Remove the Pump**
   a. Remove the four M5 screws holding the Pump Assembly and the ground wire.
   b. Grip the Pump Assembly by the motor and carefully guide the Pump Assembly through the hole in the Bridge and remove (***See Figure 6***). It may be easier to remove the Nozzle from the Pump first.

NOTE:

The tray gasket may cause the Pump Assembly to stick to the Bridge. If this happens, loosen the gasket by gently rocking the Pump Assembly back and forth.

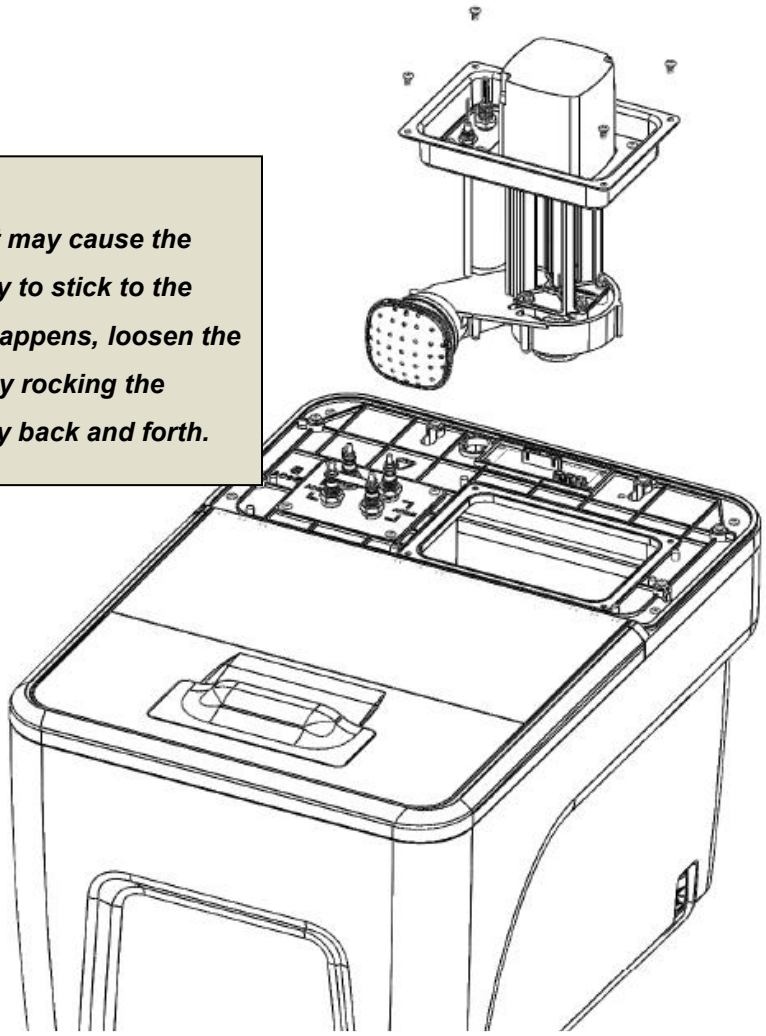


Figure 6 – Remove the Pump Assembly

B. How to Install the Pump Assembly

1. **Mount the Pump Assembly**
   a. Mount the Pump Assembly to the Bridge using the four M5 mounting screws and attach the ground wire to the tray.
2. **Attach the Pump Assembly Connectors**
   a. Thread the motor wires through the hole in the Bridge Cover.
   b. Attach the ground wire from the motor to the grounding bracket on the tub.
   c. Plug in the connector from the motor to the PCB.
   d. Plug in the three sensors to the appropriate connectors on the Connector PCB.
3. **Attach the Covers**
   a. Slide the Back Panel back onto the SCA and secure with the two M5 screws.
   b. Plug the ribbon cable from the Control Panel back into the Connector PCB, ensuring it snaps securely into the slot.
   c. Place the Top Cover back on the SCA and secure with the six M5 screws.
   d. Push the plugs back into the corresponding holes.

V. SENSOR ASSEMBLY REPLACEMENT

A. How to Remove the Sensor Assembly

1. **Remove Top Cover**
   a. Unplug the Power Cord and remove the top cover (**See How to Remove the Top Cover Section III A**).
2. **Remove the Sensor Assembly Connectors**
   a. Unplug the three white two-wire connectors for the sensors that are attached to the Connector PCB.
   b. Remove the four M5 screws holding the Sensor Assembly.
   c. Carefully remove the Sensor Assembly from SCA. It may be necessary to pry off the Sensor Assembly with a flathead screwdriver.

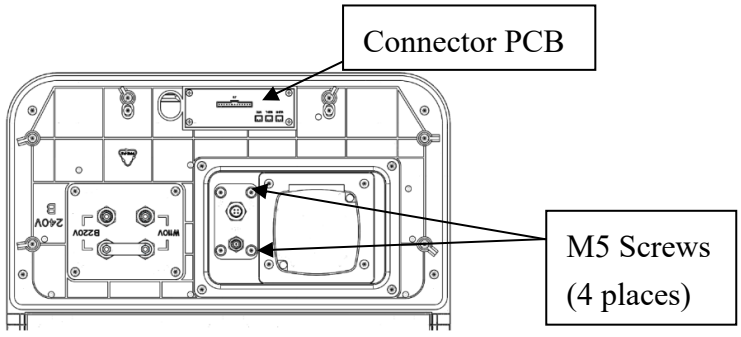


Figure 7 – Top View of SCA with Top Cover Removed

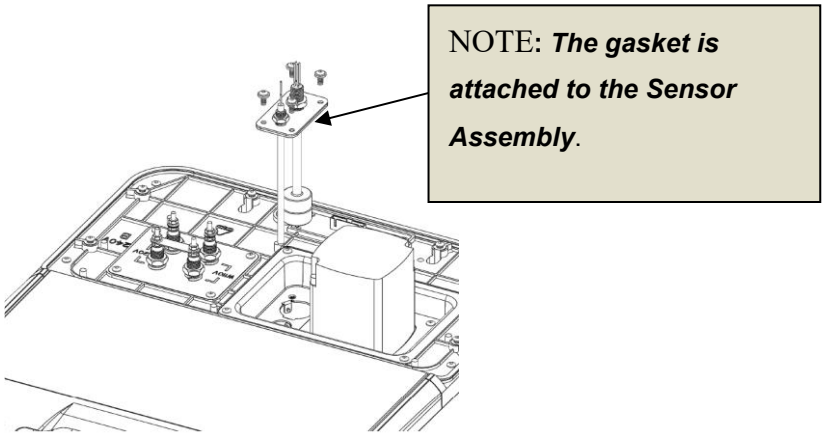


Figure 8 – Remove Sensor Assembly

B. How to Install the Sensor Assembly

1. **Mount the Sensor Assembly**
   a. Insert the Sensor Assembly into the motor tray.
   b. Mount the Sensor Assembly using the four M5 screws.
2. **Attach the Connectors**
   a. Plug in the three sensors to the appropriate connectors on the Connector PCB.
   b. Plug the ribbon cable from the Control Panel back into the Connector PCB.
3. **Attach the Covers**
   a. Place the Top Cover back on the SCA and secure with the six screws.
   b. Push the plugs back into the corresponding holes.

VI. SPRAY NOZZLE REPLACEMENT

A. How to Replace the Nozzle

1. **Replace the Nozzle**
   a. The 1200ht has an old-style and a new-style nozzle.
   b. The old-style nozzle (threaded style [**04809-01 Rev A**]) was present on SCAs from Serial Numbers HT00001 – HT01974. SCAs after SN HT01974 and new Pumps now have the Bayonet Nozzles included and are not compatible with the older Threaded Nozzles. To remove the older Threaded Nozzles, simply unscrew counterclockwise. Rotate clockwise to screw the nozzle back on. Ensure the nozzle lines up with the square opening in the Large Parts Basket.
   c. The new-style nozzle (bayonet style [**04809-01 Rev B**.]) has a latch that twists on the Pump Outlet. Twist the nozzle counterclockwise to unlatch and clockwise to latch. Ensure that Bayonet Nozzle has the O-ring in place, or it will not securely snap into place.

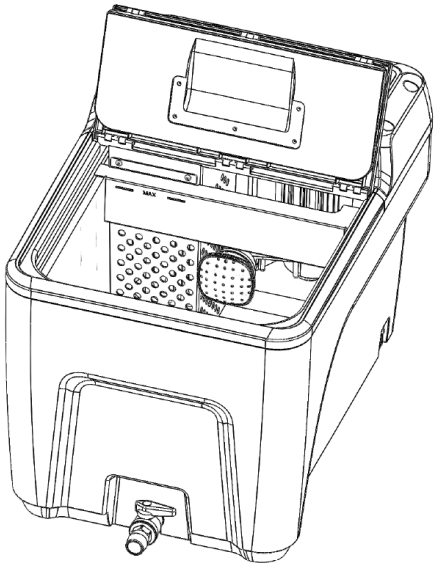


Figure 9 – Replacing the Spray Nozzle

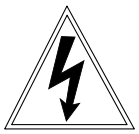
Threaded Style Nozzle

Bayonet Style Nozzle

VII. HEATER ASSEMBLY REPLACEMENT

A. How to Remove the Heater Assembly

1. **Remove the Top Cover**
   a. Unplug the SCA from power and remove the top cover (See **How to Remove the Top Cover Section III A**).
2. **Remove the Back Panel**
   a. Remove the Back Panel (**See How to Remove the Back Panel Section III B**).



SHOCK HAZARD! PLEASE ENSURE POWER PLUG IS REMOVED FROM THE SCA.

3. **Remove the Heater Assembly Connectors**
   a. Unplug the Heater Assembly's three connectors from the PCB Assembly.
   b. Gently pull the Heater Assembly wires through the hole in the Bridge Cover.

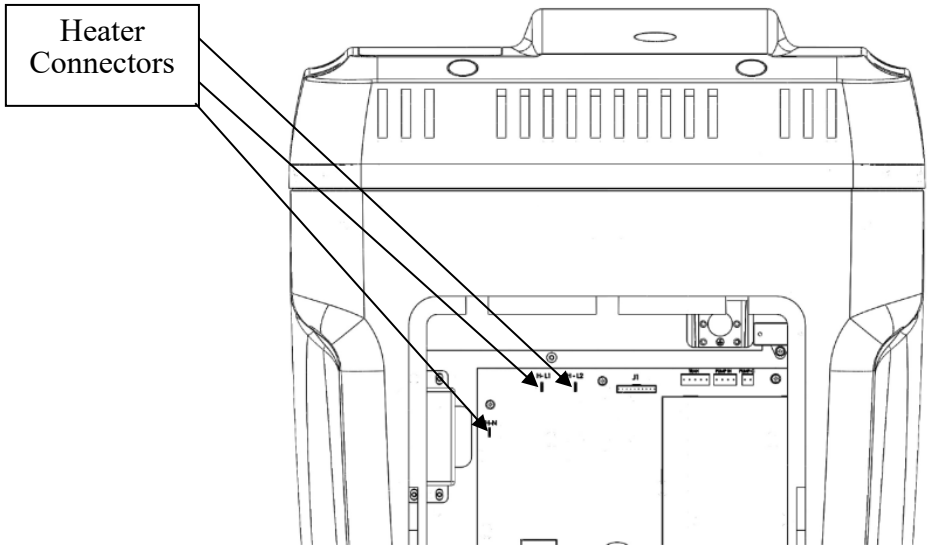


Figure 10 – Heater Connectors on the PCB Assembly

ALLOW THE HEATING ELEMENT TO COMPLETELY COOL BEFORE REMOVING

4. **Remove the Heater Assembly**
   a. Remove the four M5 screws holding the Heater Assembly and ground wire.
   b. Carefully remove the Heater Assembly from SCA.

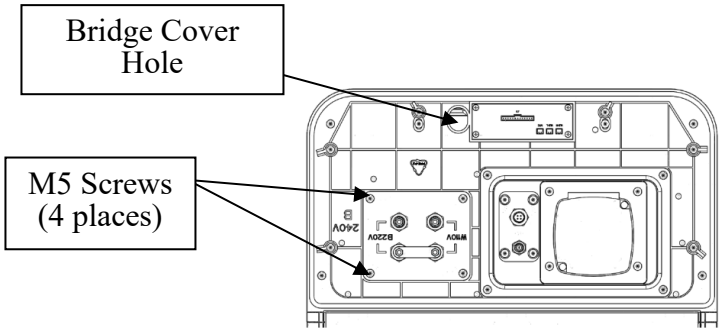


Figure 11 – Top View of SCA with the Top Cover Removed

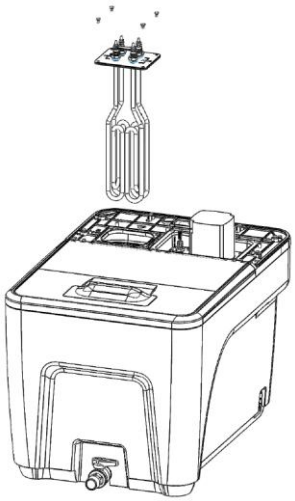


Figure 12 – Remove the Heater Assembly

B. How to Install the Heater Assembly

1. **Mount the Heater Assembly**
   a. Carefully guide the Heater Assembly through the hole in the Bridge until the plate is seated on the gasket on top of the Bridge.
   b. Mount the Heater Assembly to the Bridge using the four M5 mounting screws and attach the ground wires to the tray.
2. **Attach the Heater Assembly Connectors**
   a. Thread the Heater Assembly wires through the hole in the Bridge.
   b. Connect the three Heater Assembly wire connectors to the PCB.
3. **Attach the Covers**
   a. Slide the Back Panel back on the SCA and secure with the two screws.
   b. Plug the ribbon cable from the Control Panel back into the Connector PCB.
   c. Place the Top Cover back on the SCA and secure with the six screws.
   d. Push the rubber plugs back in the corresponding holes.

VIII. CONTROL PANEL REPLACEMENT

A. How to Remove the Control Panel

1. **Remove the Top Cover**
   a. Remove the Top Cover (**See How to Remove the Top Cover Section III A**).
2. **Remove the Display Control Panel**
   a. Turn the cover over and remove the four screws holding the ribbon cable.

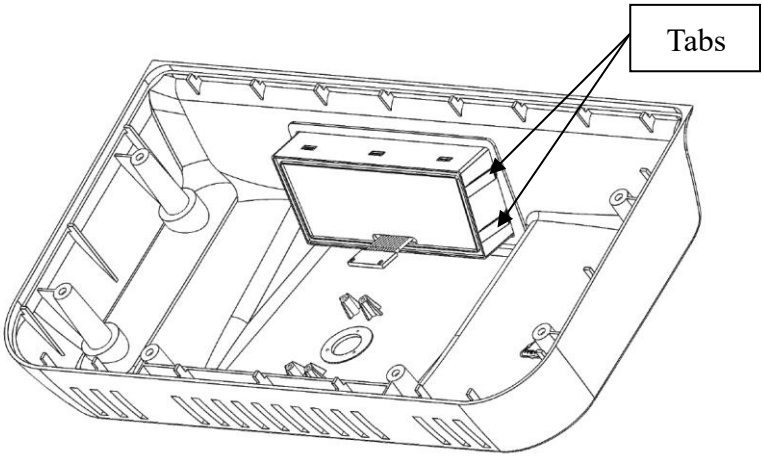
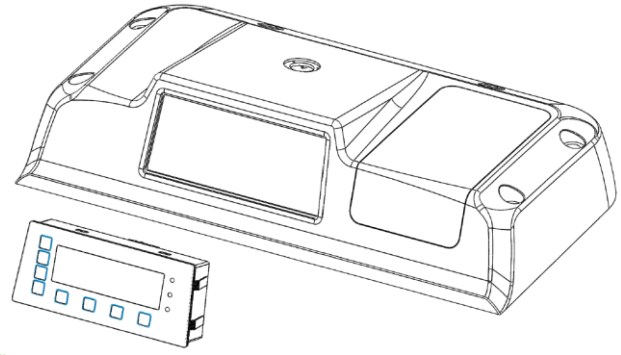


Figure 13 – Control Panel Tabs

b. Press the four tabs (two on each side) on the Control Panel and press the Control Panel out of the Top Cover.



B. How to Install the Control Panel

1. **Install the Control Panel**
   a. Thread the ribbon cable through the hole on the front of the top cover where the Control Panel will be mounted.
   b. Check the orientation of the display and proceed to press the Control Panel into the Top Cover. The Control Panel should snap into place.
   c. Place the ribbon cable between the posts on the inside of the cover.
   d. Mount the supports to the post using the four M5 screws.
   e. Plug the ribbon cable from Control Panel back into the Connector PCB
2. **Attach the Top Cover**
   a. Place the Top Cover back on SCA and secure with the six screws.
   b. Push the rubber plugs back into the corresponding holes.

IX. PCB ASSEMBLY REPLACEMENT

A. How to Remove the PCB Assembly

1. **Remove the Back Panel**
   a. Remove the Back Panel (**See How to Remove the Back Panel Section III B**).
2. **Remove the PCB Connectors**
   a. Check to make sure the labels are on the wires connected to the PCB.
   b. Remove all the wire connectors to the PCB, be careful not to rip off a wire label.
   c. Remove the six screws that hold the PCB in place.

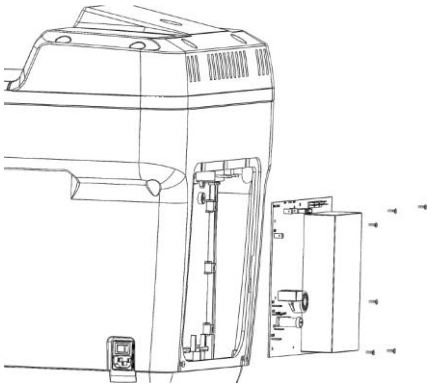


Figure 14 – Remove Screws and Remove PCB

3. Grip the edge of the circuit board and carefully slide the board up and to the left. As the PCB is removed, angle the board to clear the transformer. Make sure not to damage any wires as the board is removed.

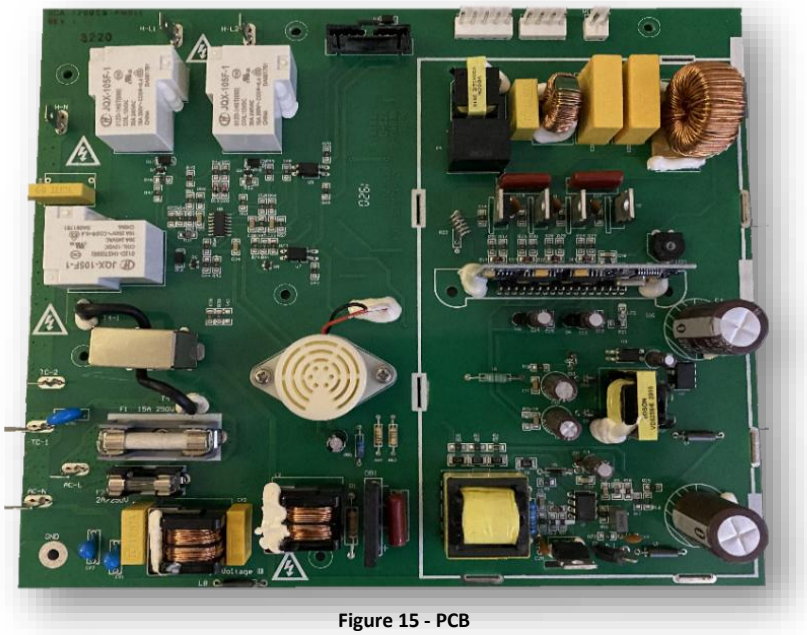


Figure 15 - PCB

B. How to Install the PCB Assembly

1. **Mount the PCB Assembly**
   a. Slide the PCB in at an angle and guide the board onto the supports at the bottom. Make sure not to damage any wires as the board is placed. Make sure no wires get behind the board before securing the screws.
   b. Mount the circuit board with the six screws.
2. **Attach the PCB Connectors**
   a. Attach the wire connectors to their proper locations by referencing the labels on the wires and the circuit board.
3. **Attach the Back Panel**
   a. Slide the Back Panel back on the SCA and secure with the two screws.

X. POWER SWITCH REPLACEMENT

A. How to Remove the Power Switch (Power Entry Module (PEM))

1. **Remove the Back Panel**
   a. Ensure the power is unplugged from the SCA.
   b. Remove the Back Panel (**See How to Remove the Back Panel Section III B**).
2. **Remove the PEM Connectors**
   a. Remove the PEM red and black wires connectors from the PCB.
   b. Remove the ground wire from the tub.

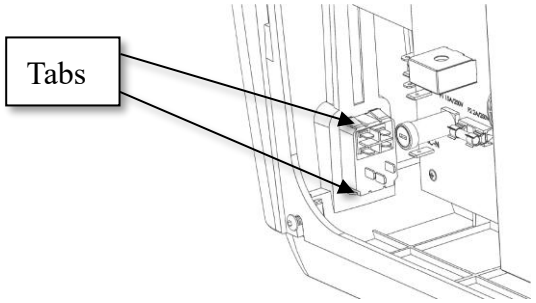


Figure 16 – Press on Tabs on Back of Switch

3. **Remove the PEM**
   a. Press the four tabs on the top and bottom of the switch and press the switch out of the case. This is usually not an easy process. If the PEM is defective and is being replaced, it is generally easier to just snap off the tabs from the PEM with a small flathead screwdriver before pulling it out. The new PEM will simply snap in.

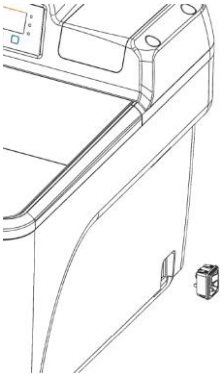


Figure 17 – Remove Switch

B. How to Install the Power Entry Module (PEM) Switch

1. **Mount the PEM**
   a. Ensure the orientation is correct and press the switch back into the case. Make sure the switch and the locking tabs are seated properly.
   b. Connect the PEM wires to the PCB. Red connects to the AC-L tab.
2. **Attach the Back Panel**
   a. Slide the Back Panel on SCA and secure with the two screws.

XI. FUSE REPLACEMENT

A. How to Replace the F1 15A 250V Fuse

1. **Remove the Back Panel**
   a. Ensure the power is unplugged from the SCA.
   b. Remove the Back Panel (**See <u>How to Remove the Back Panel</u> Section III B**).
2. **Remove the Fuse**
   a. Older models will have a plastic fuse holder (***See Figure 18***).
   b. Newer models will have a clip that holds this fuse. Simply pry out the old fuse and replace it.

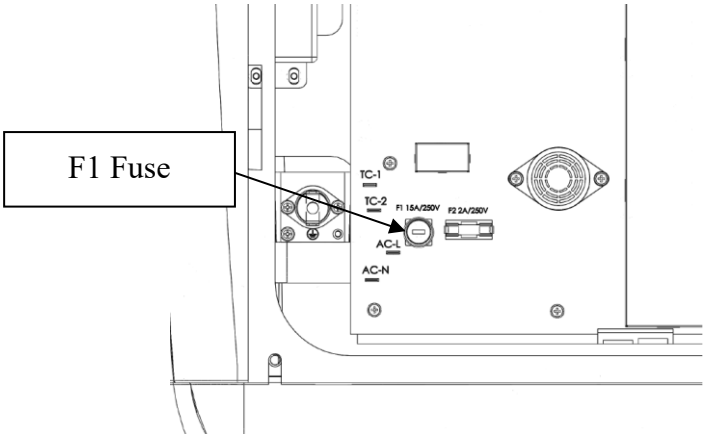


Figure 18 – F1 Fuse Holder (Old Style)

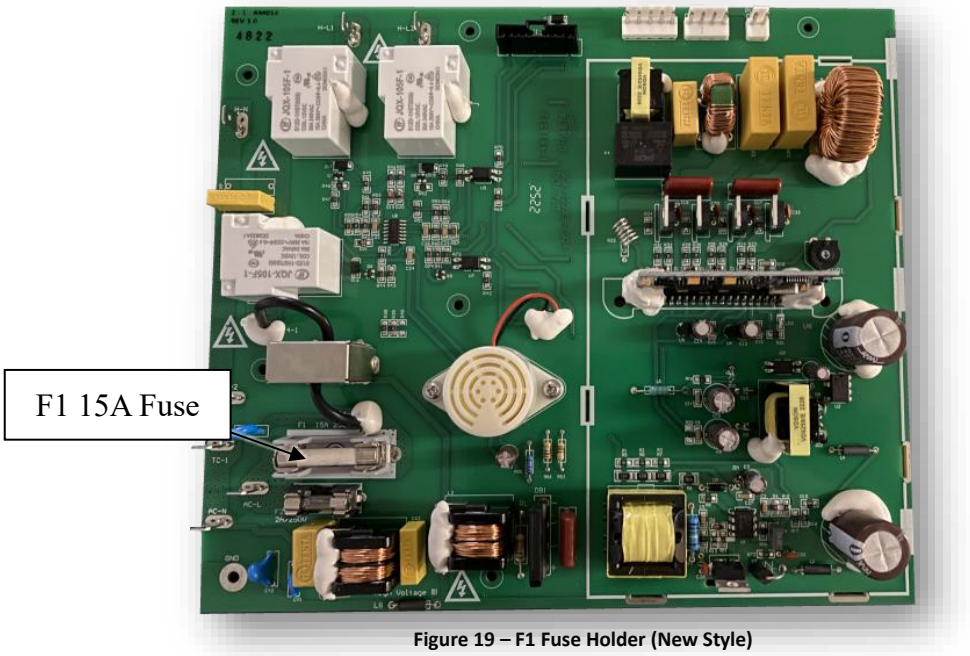


Figure 19 – F1 Fuse Holder (New Style)

3. **Attach the Back Panel**
   a. Slide the Back Panel on SCA and secure with the two screws.

B. How to Replace the F2 2-Amp 250V Fuse

1. **Remove the Back Panel**
   a. Ensure the power is unplugged from the SCA.
   b. Remove the Back Panel (**See <u>How to Remove the Back Panel</u> Section III B**).
2. **Replace the Fuse**
   a. Pry out the 2-Amp fuse.

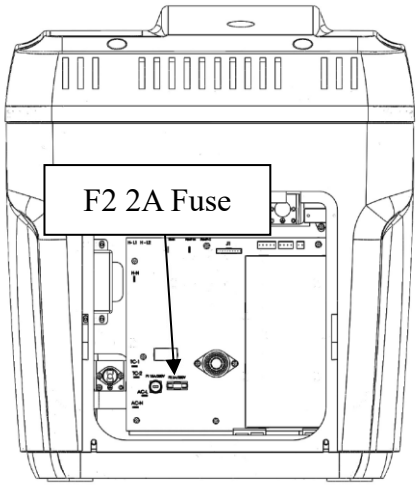


Figure 20 – F2 Fuse Holder (Old Style)

   b. Press the new fuse into the clips.

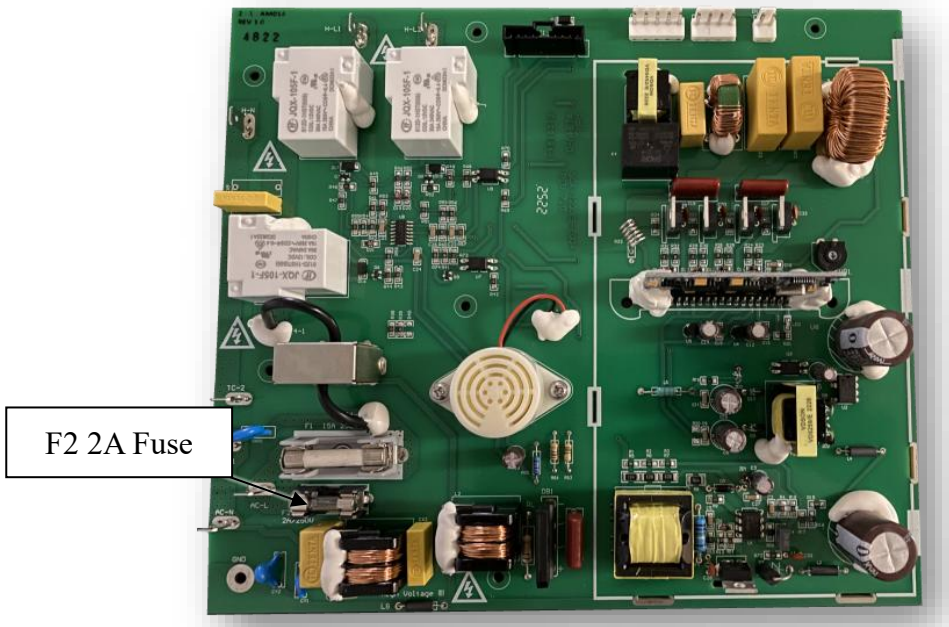


Figure 21 – F2 Fuse Holder (New Style)

3. **Attach the Back Panel**
   a. Slide the Back Panel on SCA and secure with the two screws.

XII. RESEAT THE CONNECTORS

A. How to Reseat (unplug and plug back in) the Cable Connectors

1. **Remove the Top Cover**
   a. Ensure the power is unplugged from the SCA.
   b. Remove the Top Cover (**See How to Remove the Top Cover Section III A**).
2. **Remove the Back Panel**
   a. Remove the Back Panel (**See How to Remove the Back Panel Section III B**).
3. **Reseat the Cable Connectors**
   a. Reseat (unplug and plug back in) the three white connectors at the Connector Board (***See Figure 22***). Ensure they are plugged back into the proper slots, or an error will occur).
   b. Reseat the J3 ribbon cable connector on the Connector Board (press the latch in the middle with a thumbnail to release the connector) and wiggle the connector out of the slot.
   c. Remove the 4 Phillips head screws that attach Connector Board to the Bridge Cover.
   d. Reseat J2 ribbon cable connector from the bottom of the Connector Board.
   e. Reseat J1 ribbon cable connector from the PCB.
   f. Reattach the Connector Board to the Bridge Cover with the 4 Phillips head screws and power on to see if the error is resolved.

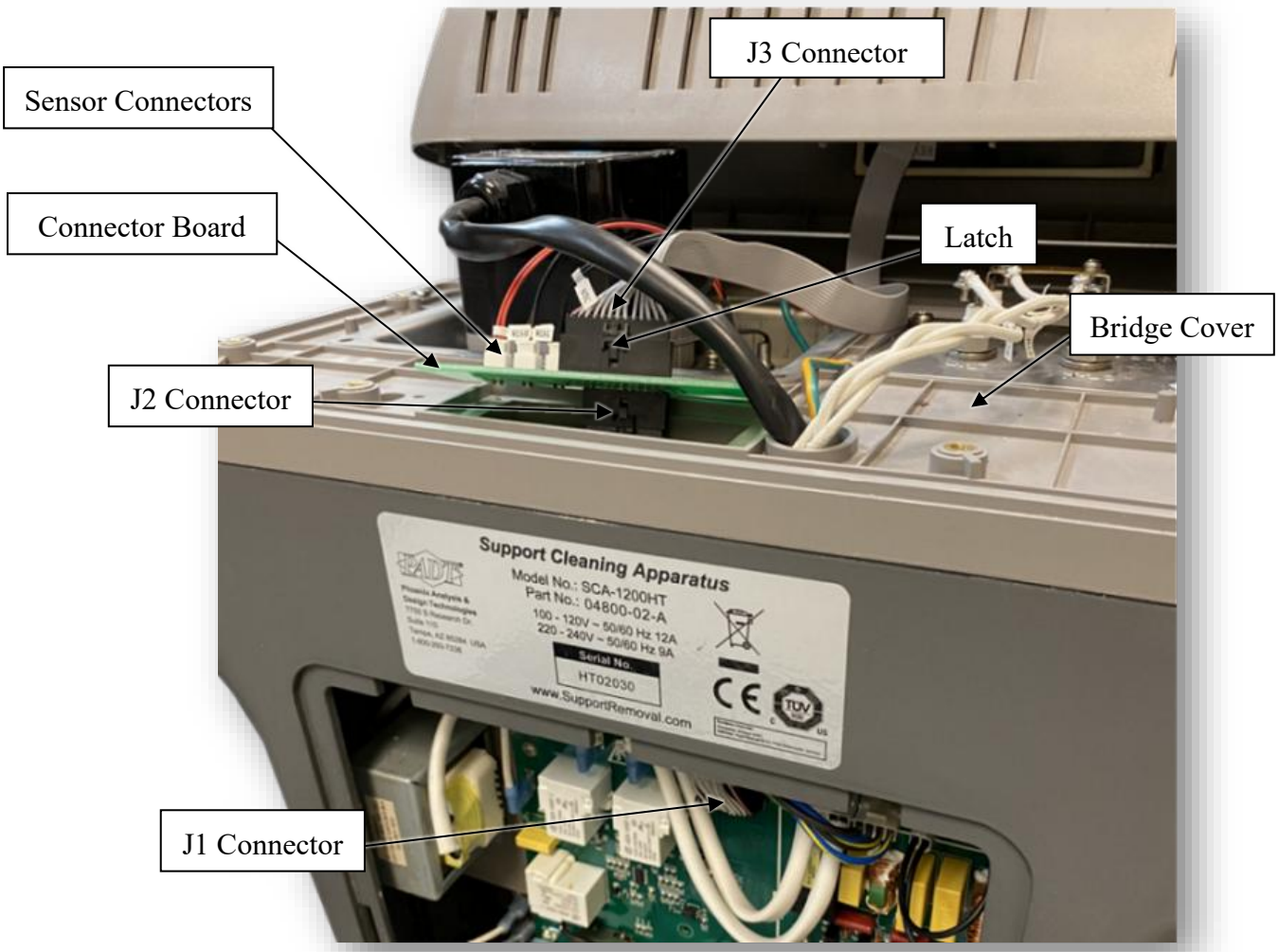


Figure 22 – Reseat the Connectors

XIII. TROUBLESHOOTING STEPS

NOTE:
*The symbol "~" prefixing the measured value denotes "**approximate**". Most measurements will not be completely accurate with the values represented in this manual, but the SCA will function normally. Usually, measurements that are extremely different from the indicated measurements will represent a possible failure in the component. All measurements should be verified several times to ensure the test probes are contacting the connector pins properly.*

Before troubleshooting individual components, it is recommended that all connectors on PCB and Connector Board be reseated (unplugged and plugged back in) to eliminate the possibility of a loose connection.

Recommended Tools

Digital Multimeter with Capacitance Selection (See red circle on Multimeter image)

.7mm Test Probes (Helpful measuring inside connector contacts)

Test Hooks (Helpful for clamping on to pins on the PCB)

Digital Multimeter with Capacitance Selection

Test Hooks

.7 mm Test Probes

A. Pump and Transformer Troubleshooting

Symptom: **Pump Inoperable, EP Error, Blowing F2 Fuse, Inverter Error, Low Circulation**

Theory: The Water Pump uses a 115VAC motor that circulates the water from the intake at the bottom of the Pump out through the Nozzle using an impeller attached to the Motor Shaft. The Transformer is used to isolate the Pump from the rest of the circuitry and to reduce Electro Magnetic Interference (EMI). The Run Capacitor gives the Pump an initial punch to rotate the Pump Motor Shaft in the proper direction as well as supply half the voltage to the Pump.

Steps:

1. **Check the Inverter Circuit LED**
   a. Remove the back panel **(See How to Remove the Back Panel Section III B).**
   b. The LED on the PCB (***See Figure 23***) should be constantly lit when the SCA is powered up. If it is blinking, it indicates there is an error on the Inverter Circuit. This can point to a probable defective PCB or a connection issue with the Control Panel.

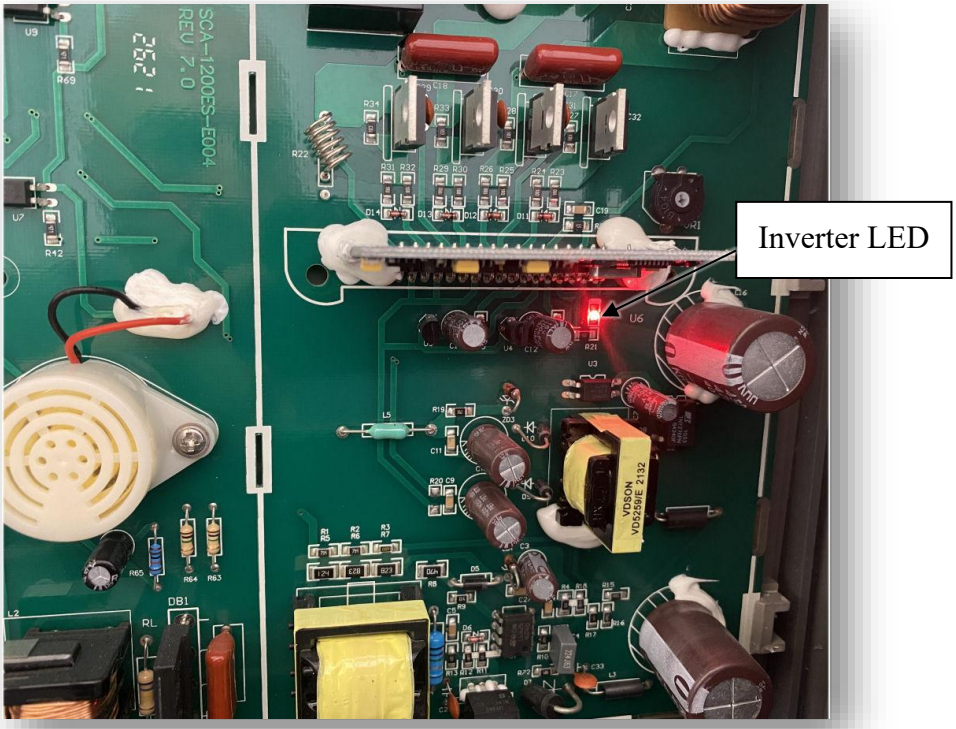


Figure 23 – Inverter LED

2. **Inspect the Pump Motor and Components**
   a. Unplug the SCA from power.
   b. Remove and inspect the Nozzle for any kind of buildup (**See Spray Nozzle Replacement Section VI**). Remove the Pump Intake Screen at the bottom of the Pump (***See Figure 24***). It is a round screen and simply pulls off. If either has a lot of buildup, remove the buildup, and see if the Pump circulates water.

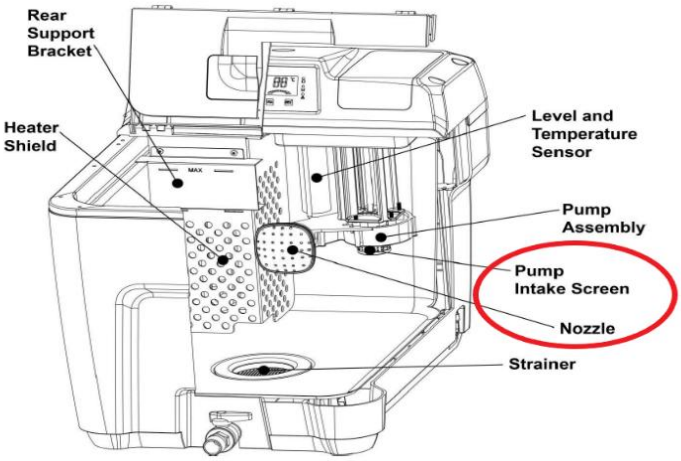


Figure 24 – Pump Screen and Nozzle

3. **Reseat the Connectors**
   a. Reseat the connectors (**See How to Reseat the Cable Connectors Section XII**).
4. **Measure Pump Motor Resistance**
   a. Ensure the SCA is unplugged from power. Remove the connector for the Pump from the "PUMP IN" pins on the PCB and measure the resistance of the Pump using the .7mm Test Probes. If these probes are not available, the contact pins can be reached from the back side of the connector, or some small staples may be used by inserting them into the connector. Choose the Resistance Selection **Ω** on the Multimeter. Check the resistance of the Pump between the wires on pins **1** & **3** on the *cable connector* (***See Figure 25***).

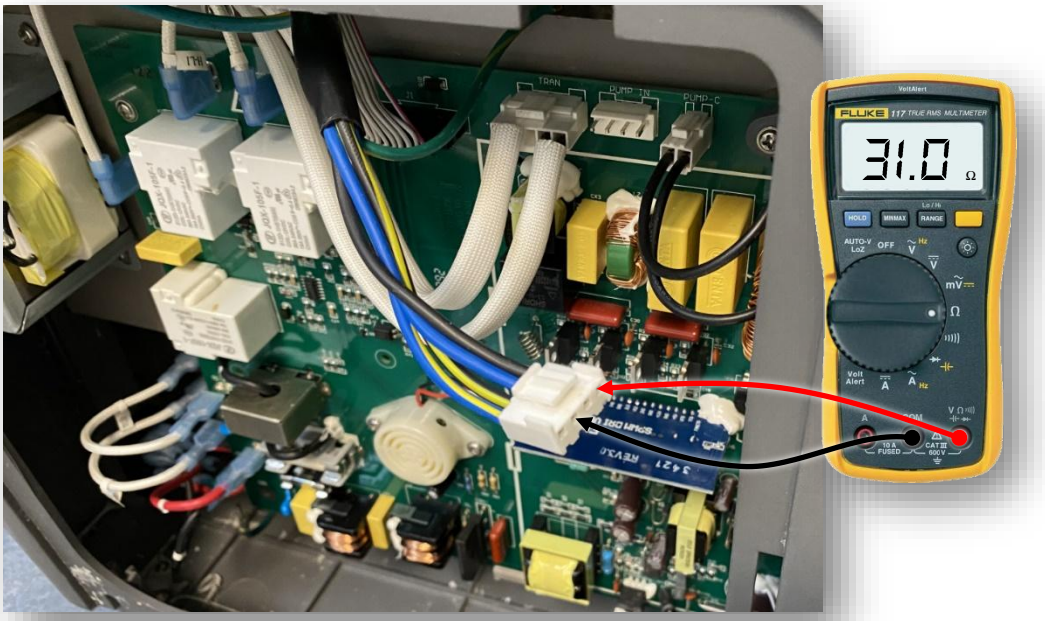


Figure 25 – Pump Resistance Measurement (pins 1 and 3)

   i. If the multimeter reads ~31.0 Ω, continue to the next step (Step b).
   ii. If the multimeter reads 0.00 Ω (shorted) or OL (open), replace the Pump. Verify initial measurement.

NOTE: A measurement of > +/- 10 ohms from the stated resistance could indicate a defective or failing motor.

b. Check the resistance of the Pump between the wires on pins **2** & **4** on the *cable connector* (***See Figure 26***).

Figure 26 – Water Pump Resistance Measurement (pins 2 and 4)

i. If the multimeter reads ~65.0 Ω, continue to the next section (Section 5).
ii. If the multimeter reads 0.00Ω (shorted) or OL (open), replace the Pump. Verify initial measurement.

NOTE*:* A measurement of > +/- 10 ohms from the stated resistance could indicate a defective or failing motor.

5. **Measure the Resistance of the Transformer**
   a. Unplug the Transformer from the "**TRAN**" connector on the PCB and measure the resistance. Check the resistance between the red wires (pins **1** and **2**) on the Transformer *cable connector* (***See Figure 27***).

Figure 27 – Transformer Resistance Measurement (red wires)

i. If the multimeter reads ~7.0 Ω, continue to the next step (Step b).
ii. If the multimeter reads 0.00Ω or OL, replace the Transformer. Verify initial measurement.

b. Check the resistance between the black wires (pins **4** and **5**) on the Transformer *cable connector* (***See Figure 28)***.

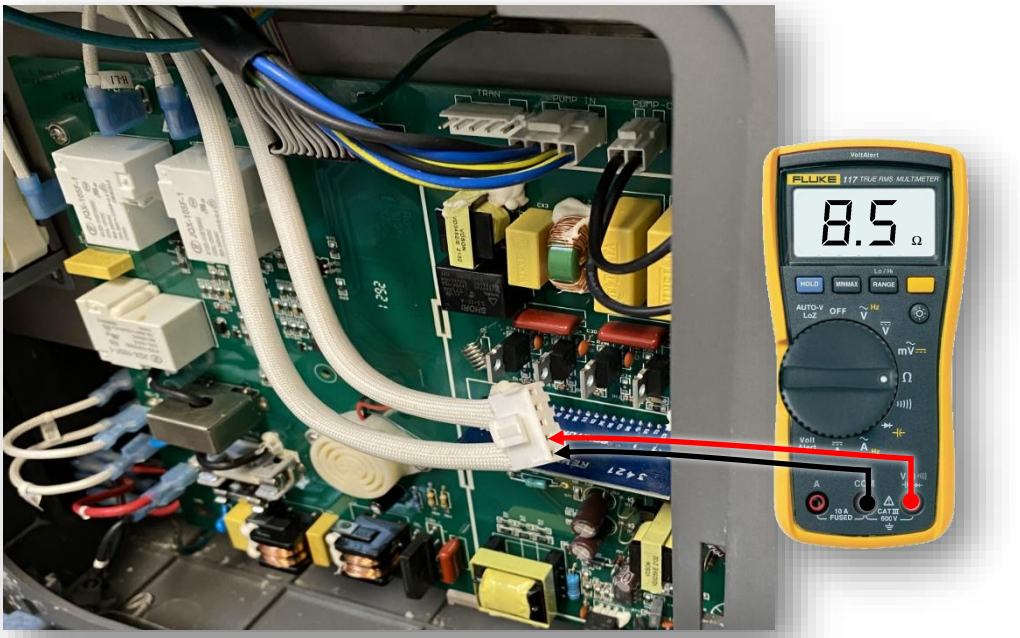


Figure 28 – Transformer Resistance Measurement (black wires)

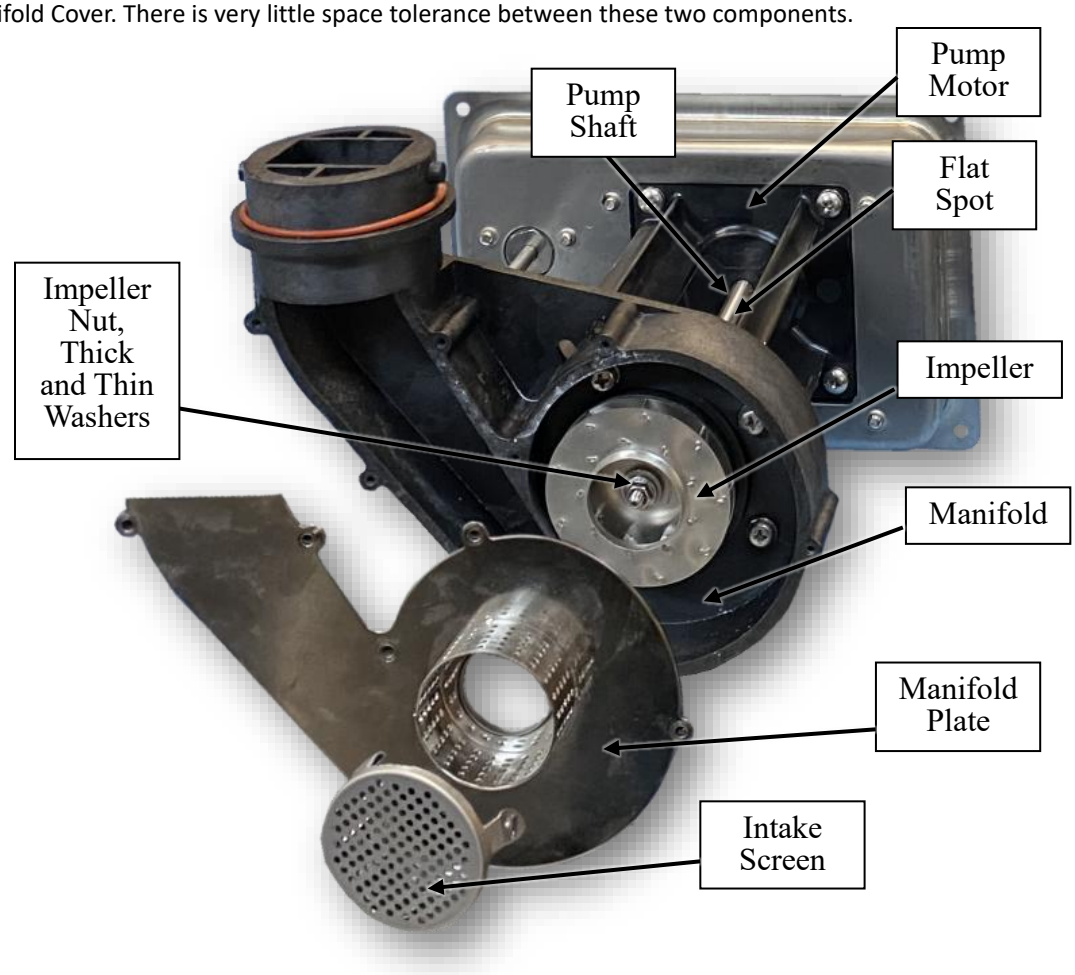
i. If the multimeter reads ~8.5 Ω, continue to the next section (Section 6).
ii. If the multimeter reads 0.00Ω or OL, replace the Transformer. Verify initial measurement.

6. **Check the Mechanical Rotation of the Pump Motor Shaft**
   a. Reach into the top of the tub and rotate the shaft of the Pump Motor by rolling a finger across the shaft (***See Figure 29***). The Pump Motor Shaft should rotate extremely easily, with no dead spots in the rotation. If the motor shaft is bound or feels rough when rotating, it should be removed for closer inspection (**See How to Remove the Pump Assembly Section IV A**).

Figure 29 – Rotate the Water Pump Motor Shaft

b. Remove and inspect the Pump Intake Screen at the bottom of the Pump for any build up or build material that may be clogging up the holes in the screen. Clean off any buildup on the screen. **A clogged screen can lead to future Pump failure. It should be checked regularly to ensure the Pump is operating unrestrained.**

c. Rotate the Pump Shaft. The shaft should rotate extremely easily and smoothly by rolling a finger across it. There should be no stiffness, rough spots or binds. If there is stiffness or it feels bound, inspect around the Impeller for any obvious buildup that can bind up the Impeller. To thoroughly inspect for any build up around the Impeller, the Manifold Plate can be removed (seven screws). Clean up any buildup around and behind the Impeller and check the rotation of the shaft again. If there is still binding, the bearings may be worn, and the pump will need to be replaced. The impeller can also be removed. To remove the impeller, use a ¼" open end wrench to secure the Pump Motor Shaft at the flat spot on the shaft. Unscrew the 7mm nut at the bottom of the impeller while locking down the shaft with the ¼" open end wrench. When placing the Impeller back on the shaft, ensure the washers are in their appropriate positions (thick and thin washers between the Impeller and nut, thick and thin washers between the Impeller and Manifold). Rotate the shaft after reattaching the Impeller and Manifold Cover. If there is any metal-on-metal sound while turning the shaft, loosen the seven screws that secure the Manifold Cover and tighten one at a time to ensure the impeller lip is not rubbing against the Manifold Cover. There is very little space tolerance between these two components.



7. **Quick Check the Run Capacitor**
   a. With all connectors plugged in and the SCA powered up, press the Start Button ⏻ . Roll a finger across the Pump Motor Shaft as in the previous test to rotate the shaft. If the Pump Motor starts up, this is an indicator that the Run Capacitor is defective. The Run Capacitor gives the Pump Motor an initial punch to get the Pump Motor Shaft rotating correctly and in the proper direction. It also supplies half the voltage to the Pump Motor. If the Pump Motor starts, and the Run Capacitor is defective, the motor will continue to run, but will only run at approximately half strength and will not have sufficient power to agitate the water well. A visual inspection of the Run Capacitor can also help determine if it is defective. If it appears there is a leak in the capacitor (a bulge, bubble or strings extruding) the capacitor is leaking Electrolyte and should be replaced.
8. **Check the Capacitance of the Run Capacitor**
   a. The capacitance can be measured with a Multimeter that has a Capacitance Selection ⊣⊢. The Selection Button on the Multimeter may need to be pressed to enable the Capacitance measurement (***See Figure 30***). Remove the Run Capacitor connector and measure the Capacitance across both wires. The Multimeter should read ~4.0 µF (microfarads).

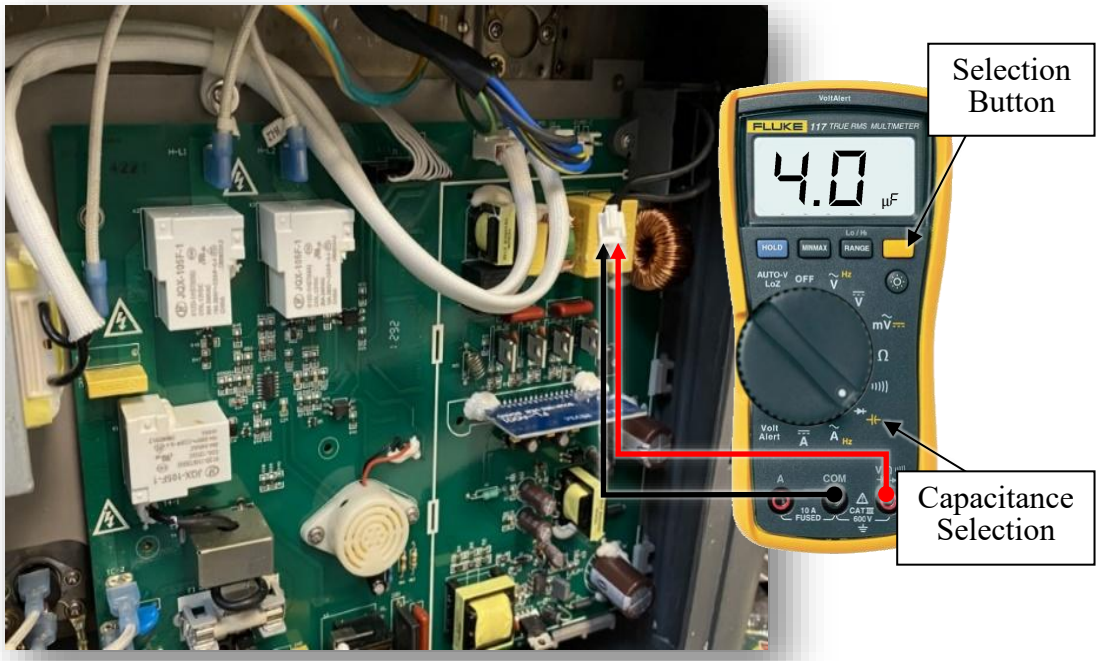


Figure 30 – Run Capacitor Check

9. **Check the Input Voltage to the Pump Motor**
   a. Set the Multimeter to the AC Voltage Selection Ṽ. With the power unplugged, disconnect the Pump Motor connector from the PCB. Plug the Run Capacitor back into the PCB. Attach the Multimeter Test Hooks to pins **1** & **3** on the "**Pump In**" pins on the PCB (***See Figure 31***).
   b. Power on the SCA and press the Start Button ⏻ to enable the Pump Motor. Measure the AC Voltage across pins **1** & **3**.
      i. If the multimeter reads ~120 VAC (~230 VAC EU), the Transformer, Control Panel and PCB are operating correctly. Continue to the next step (Step c).
      ii. If the multimeter reads ~0.00 VAC, skip to the next section (Section 10).

Figure 31 – Pump Output Voltage (pins 1 and 3)

c. Measure the AC Voltage across pins **2** & **4** (***See Figure 32***).
   i. If the multimeter reads ~120 VAC (~230 VAC EU), the PCB, Transformer and Control Panel are operating correctly.
   ii. If the multimeter reads ~0.00 VAC, this is an indication that the Run Capacitor is defective (short-circuit).

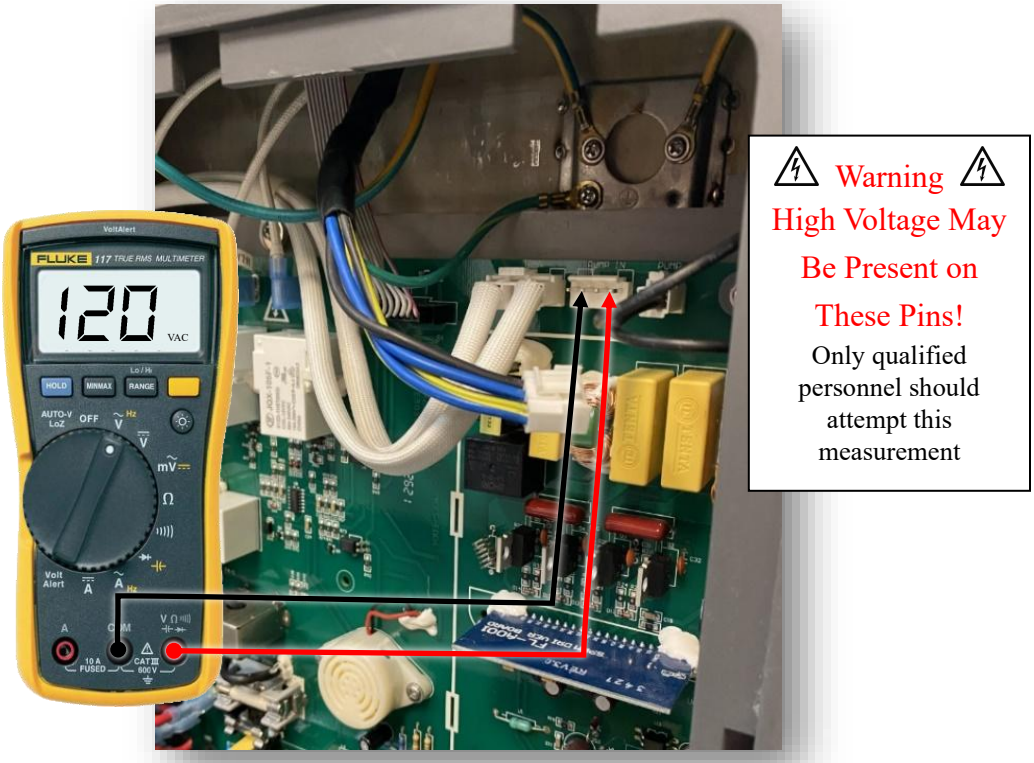


Figure 32 – Pump Output Voltage (pins 2 and 4)

10. **Check the Transformer Input Voltage**
    a. Set the multimeter to the AC Voltage Selection Ṽ. With the power unplugged, and the Transformer disconnected from the PCB, attach the multimeter Test Hooks to pins **1** & **2** on the "**TRAN**" pins on the PCB (***See Figure 33***). Plug the SCA into power, power on the SCA and press the Start Button ⏻ on the Control Panel.
        i. If the multimeter reads ~120 VAC (~230 VAC EU), the PCB and Control Panel are operating correctly.
        ii. If the multimeter reads ~0.00 VAC, the PCB or the Control Panel is defective, or there is a loose connection. Continue to the next section (Section 11).

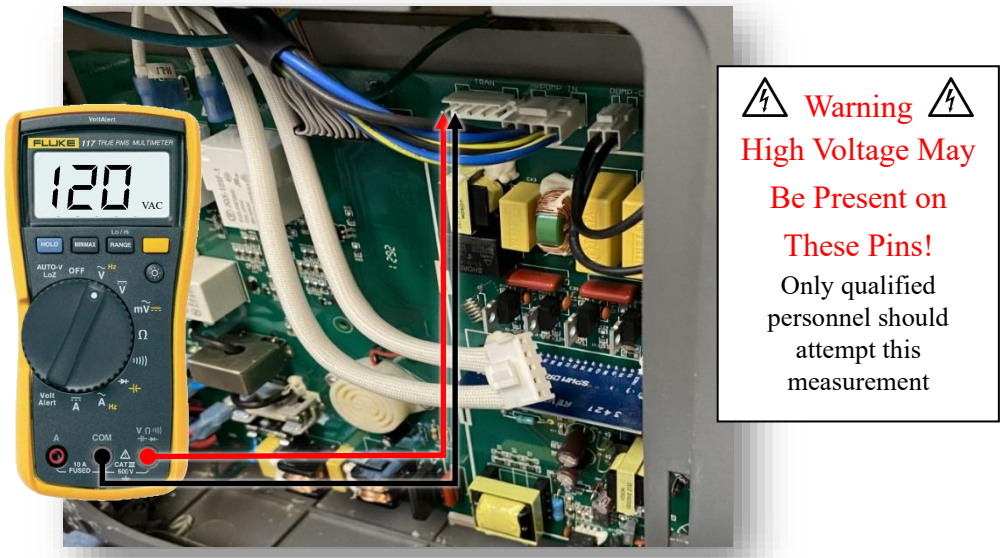


Figure 33– Transformer Input Voltage

11. **Check the Pump Motor Enable Signal**
    a. Remove the top cover (**See <u>How to Remve the Top Cover</u> Section III A**) and check the Pump Motor Enable signal from the Control Panel on the Connector Board to the PCB.
    b. Set the multimeter to the DC Voltage Selection V̄. Press the Start Button ⏻ on the Control Panel to enable the Pump Motor and measure the voltage across pin **2** (GND) and pin **4** (Motor Control Signal) on the Connector Board J2 solder joints (***See Figure 34***). When the motor is enabled, the control signal transitions from a low (~0V DC) to a high (~12V DC).
        i. If the multimeter reads ~12.0 VDC, the Control Panel is operating correctly, replace the PCB.
        ii. If the multimeter reads ~0.00 VDC, replace the Control Panel. Ensure all connectors are snapped in securely and re-verify the voltage.

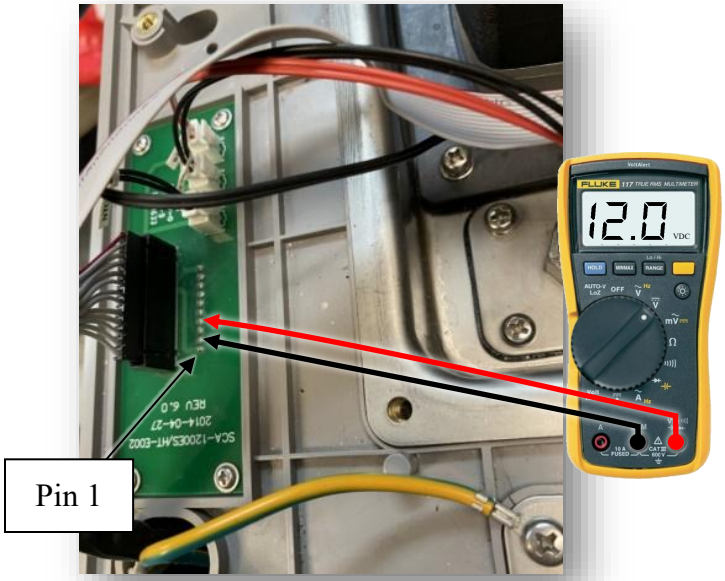


Figure 34 – Pump Motor Enable Signal

B. Heating Element Troubleshooting

Symptom: **Not Heating, Over Heating, Under Heating**

Theory: The Heating Element has an internal resistance that creates heat when current flows through. When submerged in water, the heat is transferred to the water. It should take approximately 3 minutes per degree to heat up the bath. Voltage is applied to the Heater Element upon starting the initial ramp up to the Set Temperature. When the temperature of the bath exceeds the Set Temperature by 1°C, voltage is removed from the Heating Element and the bath is allowed to cool. When the temperature of the bath drops 2°C below the Set Temperature, voltage is then applied to the Heating Element to increase the bath temperature. This process continuously cycles back and forth. An audible click can be heard as the Heater Relay energizes and de-energizes during the normal operation of the SCA.

Steps:

1. **Reseat the Connectors**
   a. Reseat the Connectors **(**See **Reseat the Connectors Section XII A).**
2. **Check the F1 Fuse**
   a. If the SCA does not heat up at all, check fuse F1 (***See Figure 35***).
      i. Set the multimeter to the Diode Test Mode ⊣▶⊢. Check the continuity of the fuse across both sides. If the fuse is blown (multimeter displays OL), replace the fuse with the same value and rating as the original (15-amp 250V) (**See Fuse Replacement Section XI A**). Skip to Section 4 to check the Heater Element resistance.
      ii. If the fuse is not blown (multimeter displays 0.00), continue to Section 3 to check the TCO.

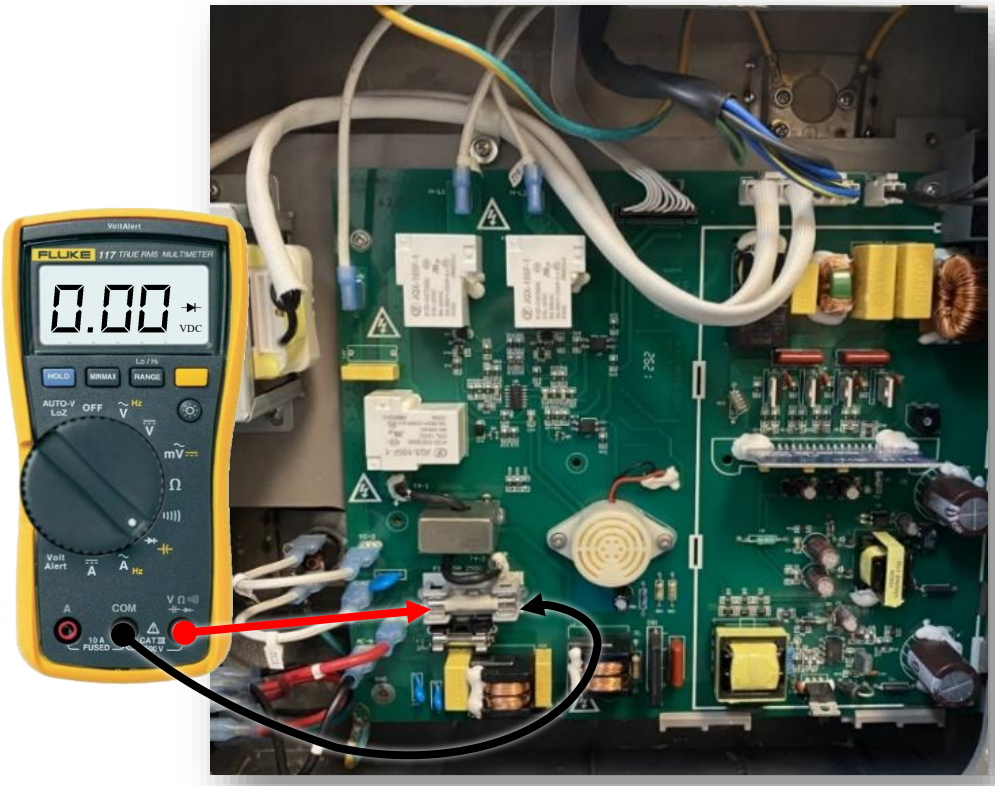


Figure 35 – F1 Fuse (Heater)

3. **Check the Thermal Cutoff Switch (TCO)**
   a. The Thermal Cutoff Switch, found on the back wall of the tank by the Main Power Switch, removes voltage from the Heater Relay if the temperature of the bath exceeds 90°C. If the switch is tripped (open), allow the temperature of the bath to drop below 80°C. Unplug power from the SCA and press the red Reset Button between the wire terminals (***See Figure 36***). A slight click will be felt while pushing in the Reset Button if it was tripped.

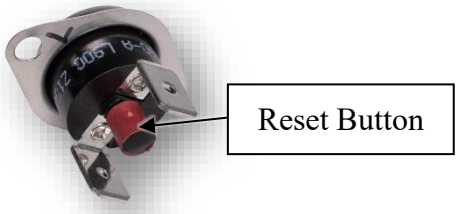


Figure 36 – TCO Reset Switch

   i. Plug in the SCA and select a temperature on the Control Panel. Press the Start Button. If the temperature does not rise in ~3 minutes, skip to the next step (Step b).
   ii. If the temperature rises, monitor the status of the temperature. It is possible the Heater Relay on the PCB is sticking causing the temperature to over shoot the Set Temperature.

   b. With the power unplugged from the SCA, remove the wire terminals from the Thermal Cutoff Switch on the PCB. Set the multimeter to the Diode Test Mode ⊣▶⊢ and connect the probes to the wire terminals (***See Figure 37***). Check the continuity of the switch between the terminals.

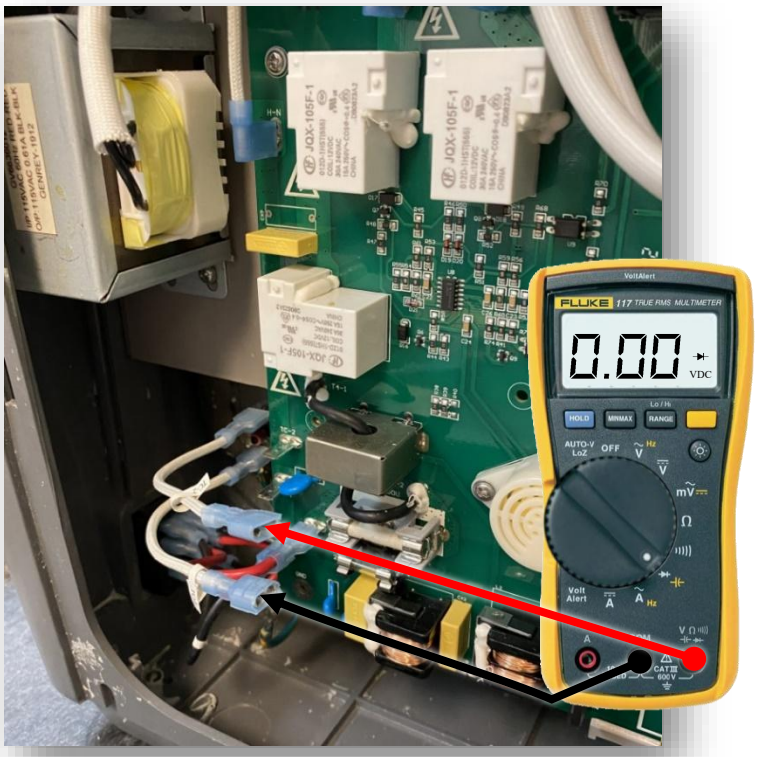


Figure 37 – TCO Continuity Test

   i. If the multimeter displays continuous (0.00), the TCO is operating correctly.
   ii. If the multimeter displays (OL), it is either tripped (open) or it is defective. Press the reset button on the TCO when the temperature of the bath is below 80°C. If the multimeter still reads open (OL), replace the TCO. Verify initial measurements.

4. **Heater Element Resistance Test**
   a. Unplug the SCA from power.
   b. Remove the top cover (**See How to Remove the Top Cover Section III A).**
   c. Set the multimeter to the Resistance Selection **Ω**. Check the resistance of the Heating Element (***See Figure 38***).

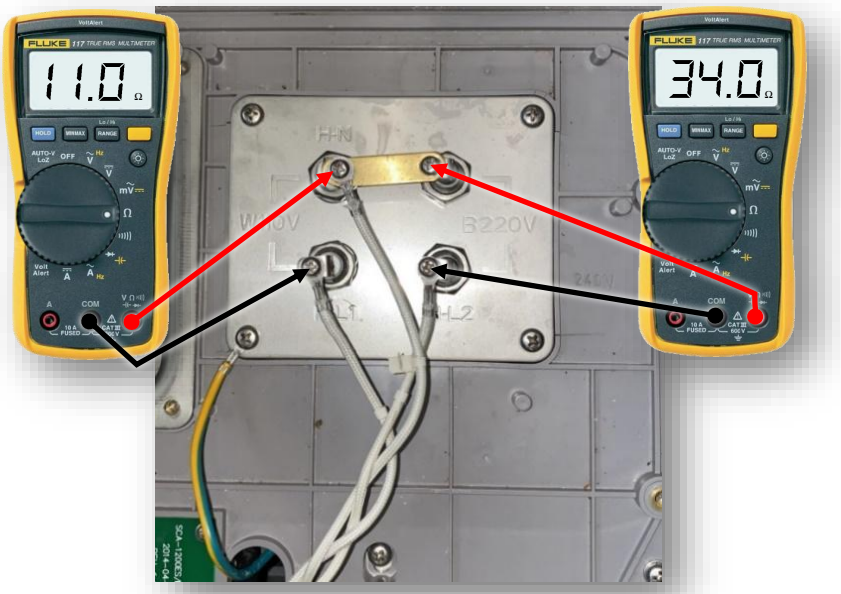


Figure 38 – Heating Element Resistance Check

   i. On 120V AC (US) Systems, if the multimeter reads ~11.0 Ω between H-N and H-L1, the Heater Element is operating correctly. Continue to the next section (Section 5).
   ii. On 230V AC (US) Systems, if the multimeter reads ~34.0 Ω between H-N and H-L2, the Heater Element is operating correctly. Continue to the next section (Section 5).

   d. If the multimeter reads 0.00 Ω (shorted) or OL (open), replace the Heater Elements. Verify initial measurements.

5. **Heater Element Voltage Test**
   a. Set the multimeter to the AC Voltage Selection Ṽ. With power applied and a heat setting activated, press the Start Button ⏻ and check the voltage to the Heating Element (***See Figure 39).*** Voltage will only be applied to the Heater Element when the temperature of the bath is *not* at the Set Temperature (ramp up).

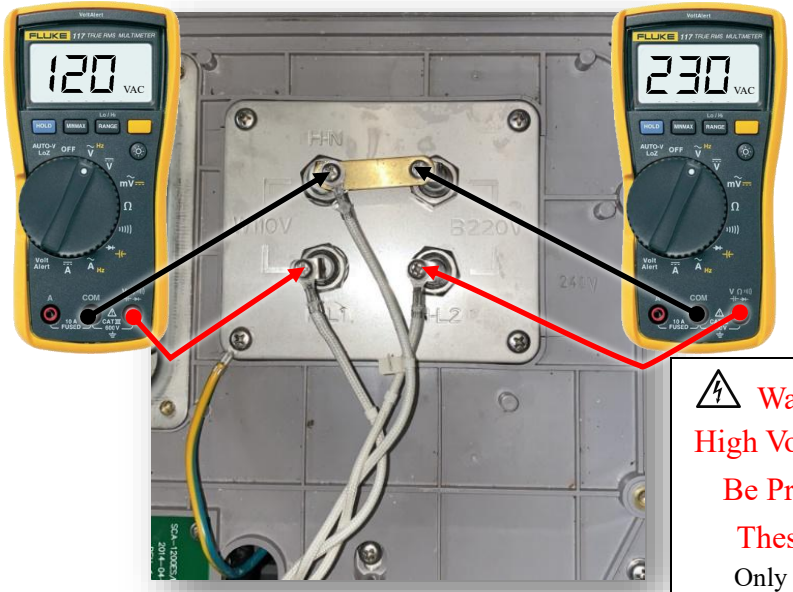


Figure 39 – Heating Element Input Voltage

⚠ Warning ⚠
High Voltage May Be Present on These Pins!
Only qualified personnel should attempt this measurement

i. On 120V AC (US) Systems, if the multimeter reads ~120 VAC between H-N and H-L1, the Control Panel and the PCB are operating correctly.
ii. On 230V AC (EU) Systems, if the multimeter reads ~230 VAC between H-N and H-L2, the Control Panel and the PCB are operating correctly.

b. If the multimeter reads ~0.00 VAC, skip to the next section (Section 6).

> NOTE:
> There are two Heater Elements on the SCA 1200ht. One Heater Element (left) is dedicated to 120V AC (US) only, the other (right) is dedicated to 230V AC (EU). Only one Element is used and only one Element will have voltage depending on the input voltage. They are not interchangeable.

6. **Heater Element Control Signal Test**
   a. Select a Heat Setting and press the Start Button ⏻ on the Control Panel. Ensure the bath temperature is not at the Set Temperature. The Control Panel will not send a signal to the PCB when the bath temperature is equal to the Set Temperature.
   b. Set the multimeter to the DC Voltage Selection ⩛. Measure the voltage across pin **2** (GND) and pin **7** (Heating Tube Control Signal Input) on the Connector Board J2 solder joints (***See Figure 40***). When the Start Button is pressed, the control signal transitions from a low (~0V DC) to a high (~12V DC). This energizes the Heater Relay.
      i. If the multimeter reads ~12.0 VDC across pins 2 and 7 on the J2 solder joints when the Start Button is pressed, the Control Panel is operating correctly.
      ii. If the multimeter reads ~0 VDC, the Control Panel or the Temperature Sensor may be defective.
   c. If there is ~0V DC between pins **2** & **7** on the J2 solder joints when the Start Button is pressed, check the Temperature Sensor (**See <u>Temperature Sensor Troubleshooting</u> Section XIII C**).

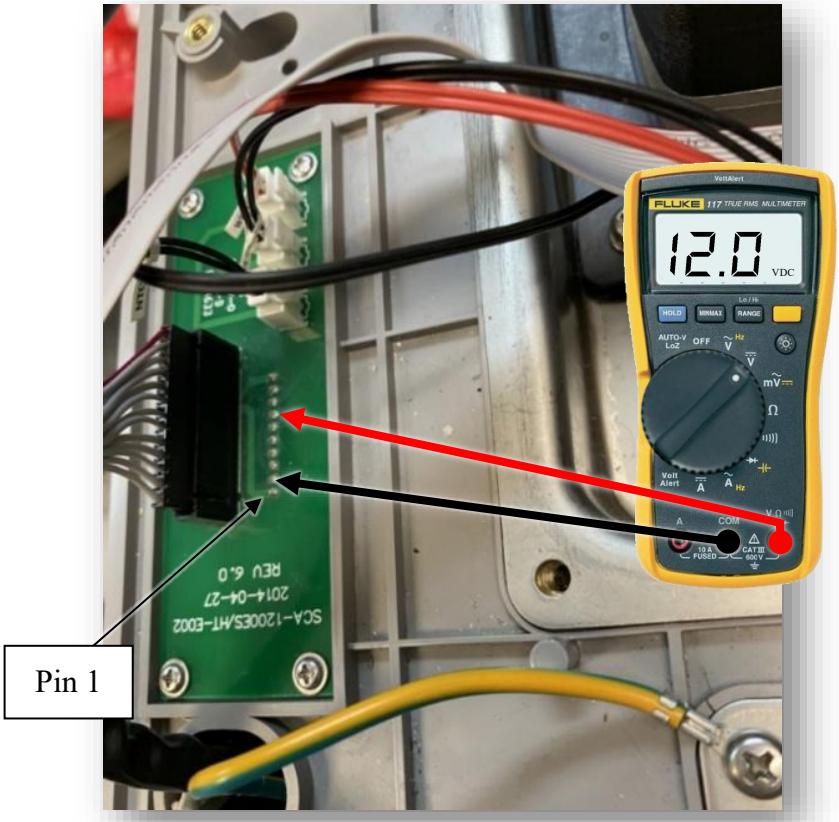
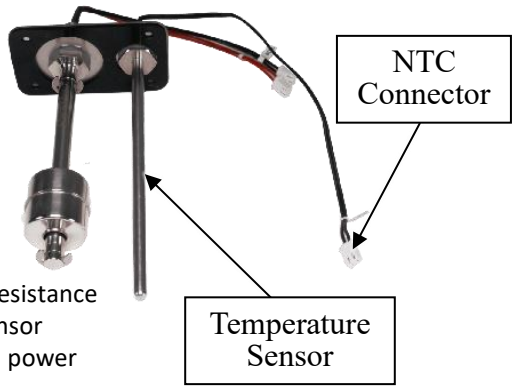


Figure 40 – Connector Board Heater Control Signal J2

C. Temperature Sensor Troubleshooting



Symptom: **Not Heating at all, Over Heating, Under Heating, r1 Error**

Theory: The Temperature Sensor changes resistance according to the temperature of the bath. As the temperature increases, the resistance of the sensor decreases (***See Figure 41***). The Temperature Sensor resistance is evaluated by the Control Panel to regulate when power is applied to the Heater Relay.

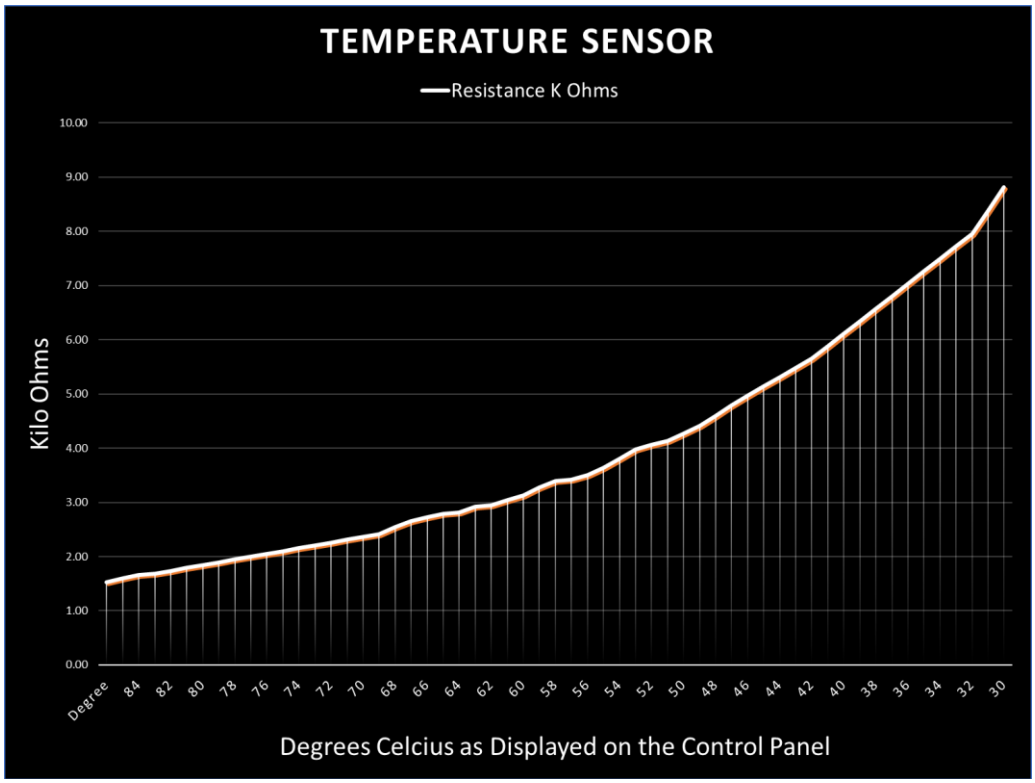


Figure 41 – Temperature/Resistance Correlation

If the Temperature Sensor is defective (giving inaccurate resistance measurements):

- The bath may not reach the Set Temperature.
- The bath may overheat, possibly tripping the Thermal Cutoff Switch (TCO).
- There will be an r1 error (abnormal resistance value).

Steps:

1. **Reseat the Connectors**
   a. Reseat the Connectors (See **Reseat the Connectors Section XII A**).
2. **Check the resistance of the Temperature Sensor**
   a. Unplug the SCA from power and remove the Top Cover (See **How to Remove the Top Cover Section III A**).
   b. Unplug the NTC connector (***See Figure 42***)
   c. Set the multimeter to the Resistance Selection **Ω** and check the resistance of the Temperature Sensor across both wires on the **NTC** connector using the .7mm probes. Small staples can also be used by pushing them into the connector pins if the .7mm probes are unavailable. At room temperature, the resistance should read between 12k and 8k (depending on what the actual room temperature is). Plug the **NTC** connector back in and power on the SCA.

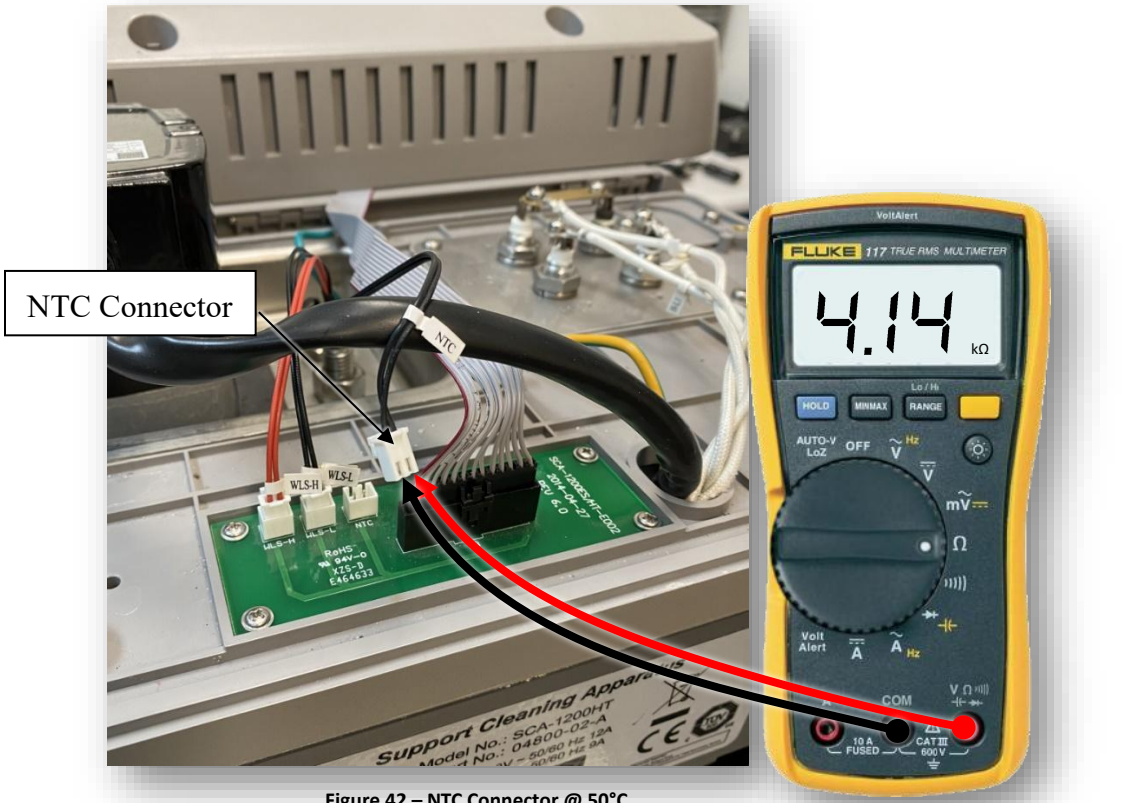
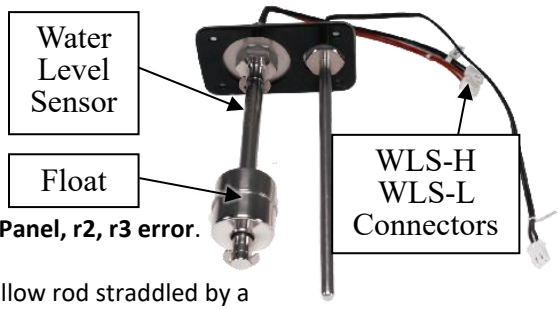


Figure 42 – NTC Connector @ 50°C

3. **Check the resistance at 50°C**
   a. Set the SCA to 50°C and press the Start Button ⏻. When the bath heats up and the Control Panel displays 50°C, turn off the SCA and unplug the power cord. Unplug the NTC connector and measure the resistance across both wires. The multimeter should read ~4.14 kΩ. Try different heat settings and compare the resistance values to the table below (***See Table 1***). If the resistance measurements are not approximate to the values below, replace the Temperature Sensor. Verify initial measurements.

Temperature	Resistance
85°C	~ 1.53 kΩ
70°C	~ 2.31 kΩ
60°C	~ 3.04 kΩ
50°C	~ 4.14 kΩ
Room Temp ~30°C	~ 8.83 kΩ

Table 1 – Temperature Resistance Values



D. Water Level Sensor Troubleshooting

Symptom: **SCA beeping, High or Low Water LED flashing on Control Panel, r2, r3 error.**

Theory: The Water Level Sensor uses two internal switches within a hollow rod straddled by a watertight Stainless-Steel float that slides along the rod as the water level changes. As the float reaches the minimum or maximum water level, the magnetic properties of the float close an internal switch which generates an error.

Steps:

1. **Reseat the Connectors**
   a. Reseat the Connectors (See **Reseat the Connectors Section XII A).**
2. **Check the resistance of the Water Level Sensor**
   a. Remove the sensor from the mounting plate (**See Sensor Assembly Replacement Section V)**.
   b. Visually inspect the Water Level Sensor Assembly. If there is a buildup on the shaft that inhibits the free up and down motion of the float, clean off the buildup. A soft scrub pad can be used to remove any buildup on the shaft. Ensure the float moves freely from the bottom to the top of the shaft.
   c. Set the multimeter to the Resistance Selection **Ω** and check the resistance across both wires of the **WLS-H** connector. If the resistance measured does not approximate the values below, replace the Water Level Sensor.
      i. Move the float to the middle of the shaft.
         - Multimeter should read ~22.0 kΩ (***See Figure 43***).
      ii. Move the float to the top of the shaft.
         - Multimeter should read 0.00 Ω (continuous) (***See Figure 44***).

Figure 43 – WLS-H Resistance

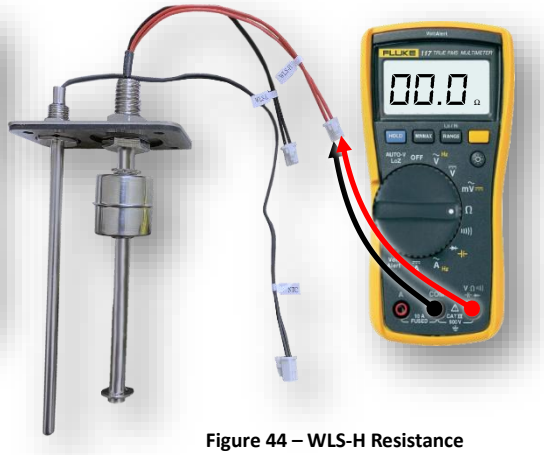


Figure 44 – WLS-H Resistance

   d. Check the resistance across the **WLS-L** connector.
      i. Move the float to the middle of the shaft.
         - Multimeter should read ~22.0 kΩ (***See Figure 45***).
      ii. Move the float to the bottom of the shaft.
         - Multimeter should read 0.00 Ω (continuous) (***See Figure 46***).

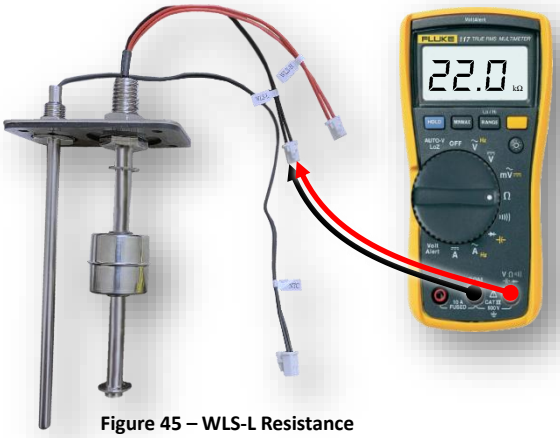


Figure 45 – WLS-L Resistance

Figure 46 – WLS-L Resistance

E. No Power to SCA Troubleshooting

Symptom: **SCA Appears to have no power, there are no audible clicks when toggling the power switch, the LED on the PCB is not lit.**

Theory: The SCA requires 110-120VAC (US) or 220-230VAC (Europe). The SCA chooses the correct configuration automatically according to the input power via an Evaluation Relay.

Steps:

1. **Reseat the Connectors**
   a. Reseat the Connectors (See **Reseat the Connectors Section XII A).**
2. **Check the Continuity of F2**
   a. Set the multimeter to the Diode Test Mode ⊣▶⊢. Remove power from the SCA. Check the continuity of fuse F2 across both ends (***See Figure 47***).
      i. If the multimeter displays continuous (0.00), the fuse is good, skip to the next section (Section 3).
      ii. If the multimeter displays open (OL), the fuse is blown, continue to the next step (Step b).

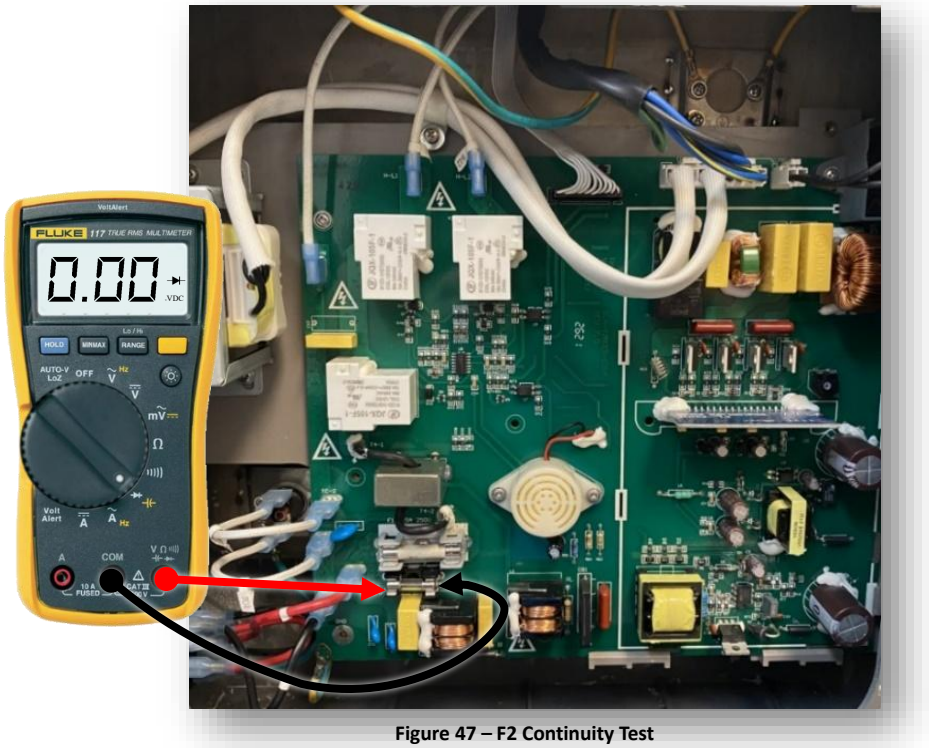


Figure 47 – F2 Continuity Test

   b. Unplug the SCA from power. Disconnect the Pump and Transformer connectors from the PCB (***See Figure 48***). Replace the fuse. Plug the SCA into power and toggle the Power Switch on. If the fuse does not blow immediately when powering up, press the Start Button on the Control Panel.
      i. If the fuse blows, with the Transformer and Pump disconnected from the PCB, the PCB will need to be replaced. The Pump and associated components must be checked to determine if a defective component external from the PCB caused the PCB failure. **Failure to check the other components prior to replacing the PCB can result in the new PCB being damaged by the defective component.** The critical components that need to be checked prior to replacing the PCB will be the resistance of the Pump Motor and the mechanical rotation of the Pump Motor Shaft (**See Pump and Transformer Troubleshooting Section XIII A**)

ii. If the fuse does not blow, with the Transformer and Pump disconnected from the PCB, the PCB is probably still good. The Pump and associated components should be checked to determine which component is defective (**See Pump and Transformer Troubleshooting Section XIII A**). It is possible multiple components can be defective, so the entire Pump and Transformer Troubleshooting section should be checked. The F2 fuse will blow if the Pump Motor resistance is too low, or there is a mechanical bind in the Pump Motor Shaft.

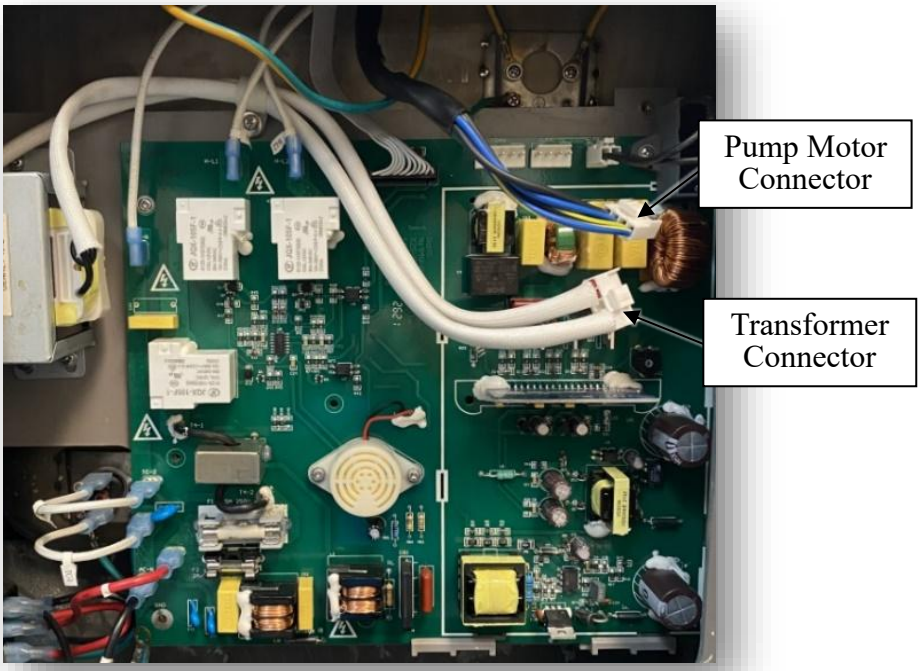


Figure 48 – Pump and Transformer Connectors

3. **Measure the Input Power**
   a. With the AC voltage selected on the multimeter, measure the voltage at the Power Outlet. It should read ~120 VAC(US) / ~230 VAC(EU) (***See Figure 49***).
      i. If voltage is present, continue to the next step (Step b).
      ii. If no voltage is present, check the building's circuit breakers.

Figure 49 – US Input Voltage

b. With the Power Cord plugged into the outlet measure the voltage at the female end of the Power Cord (***See Figure 50***).
   i. If voltage is present, continue to the next step (Step c).
   ii. If voltage is not present, check the continuity of the Power Cord and replace as needed.

Figure 50 – US Input Voltage

c. With the Power Cord unplugged from the SCA, disconnect the **AC-L** and **AC-N** from the PCB. Attach the multimeter leads between **AC-L** and **AC-N** wire terminals (***See Figure 51***). Plug in the Power Cord, switch the power on (I) and measure the voltage at the output of the Power Entry Module (PEM).
   i. If voltage is present, replace the PCB.
   ii. If voltage is not present, continue to the next step (Step d).

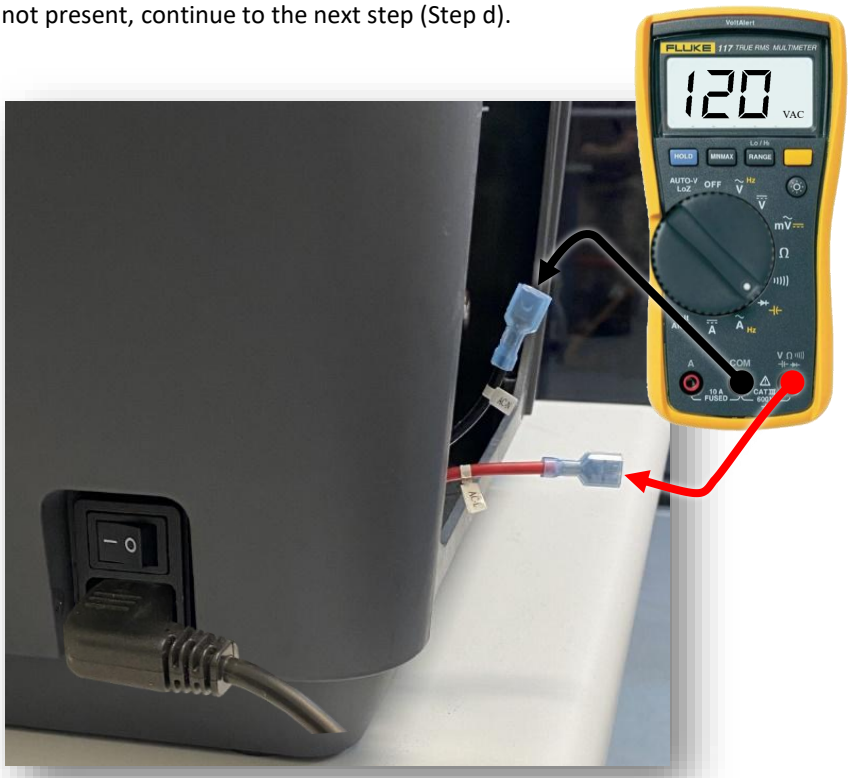


Figure 51 – PEM Output Voltage

d. Unplug the power cord from the SCA. Set the Multimeter to the Diode Test Mode →|←. Connect one probe of the multimeter to the **AC-L** (red wire) terminal of the PEM and the other probe to the **L** male post (right prong) at the input receptacle (***See Figure 52***).
   i. With the switch "On" (I), the multimeter should read continuous (0.00).
   ii. With the switch "Off" (O), the multimeter should read open (OL).

Figure 51 – PEM Continuity L → AC-L

e. Connect one probe of the multimeter to the **AC-N** (black wire) terminal of the PEM and the other probe to the **N** male post (left prong) at the input (***See Figure 52***).
   i. With the switch "On" (I), the multimeter should read continuous (0.00).
   ii. With the switch "Off" (O), the multimeter should read open (OL).

Figure 52 – PEM Continuity N → AC-N

F. No Power to Display Troubleshooting or ES Error

Symptom: **The SCA Control Panel appears to have no power and is not lit up when powering on the SCA. Upon plugging in to power and toggling the power switch, there *are* audible clicking sounds and the LED is lit on the PCB. Or the Display lights up but there is an ES Error.**

Theory: The Control Panel should light up when the Power Switch is toggled on, and it requires ~12 VDC from the PCB to operate.

Steps:

1. **Reseat the Connectors**
   a. Reseat the Connectors **(**See **<u>Reseat the Connectors</u> Section XII A).**
   b. Power on the SCA. If the display powers up, there was probably a loose connection.
2. **Measure the Display Voltage**
   a. Measure the voltage between pin **2** (GND) & pin **10** (12V DC) on the Connector Board J2 solder joints (***See Figure 53***).
      i. If the multimeter reads greater than ~9.0 VDC between pin **2** & pin **10** on the Connector Board J2 solder joints when the SCA is powered up, replace the Control Panel.
      ii. If the multimeter reads less than 9.0 VDC between pin **2** & pin **10** on the Connector Board J2 solder joints when the SCA is powered up, replace the PCB.
   b. It is possible the ribbon cable between the J1 and J2 connectors is defective. Additional voltage measurements can be found for the pinouts of the connectors (**See <u>Control Panel Cable Connectors</u> Section XIV D)**. In the case of no power to the display, voltage can be checked between pin **1** (12 VDC) & pin **9** (GND) at the J1 connector on the PCB. The ribbon cable can also be checked for continuity between these two connectors.

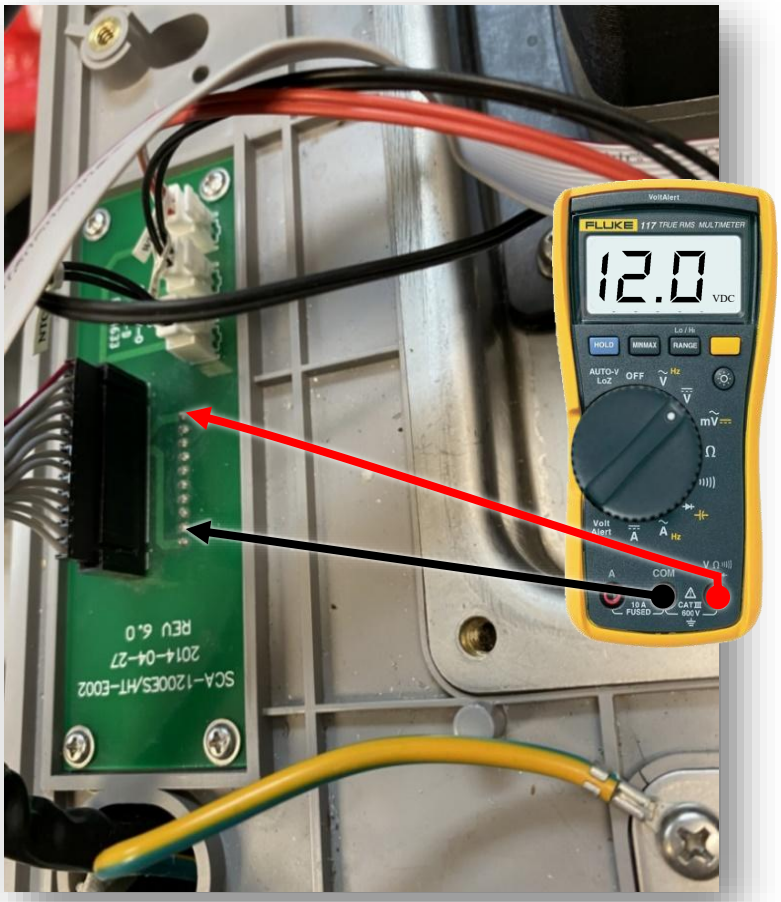


Figure 53 – Control Panel 12V Input Voltage

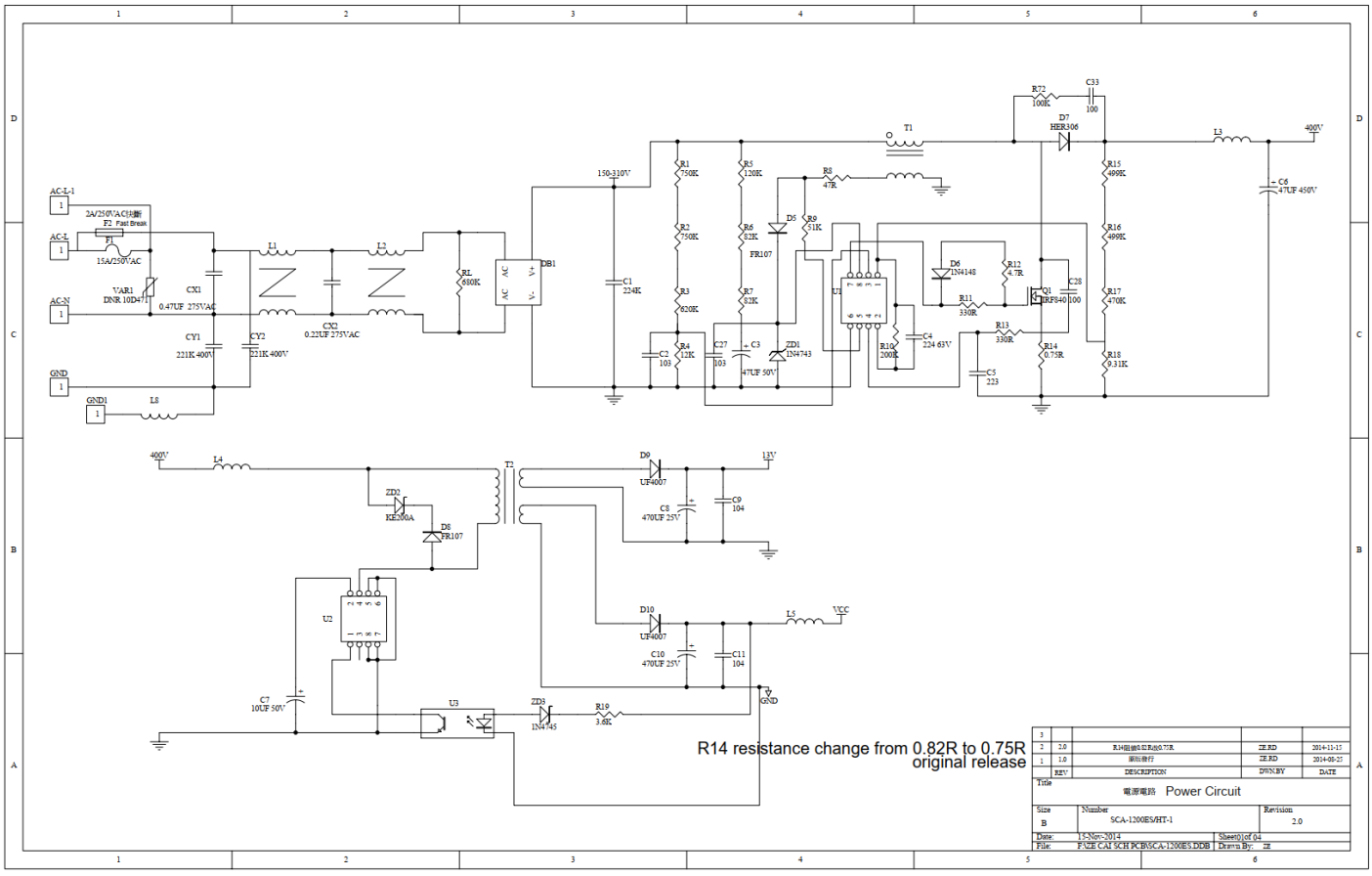
XIV. DOCUMENTATION

A. Error Codes

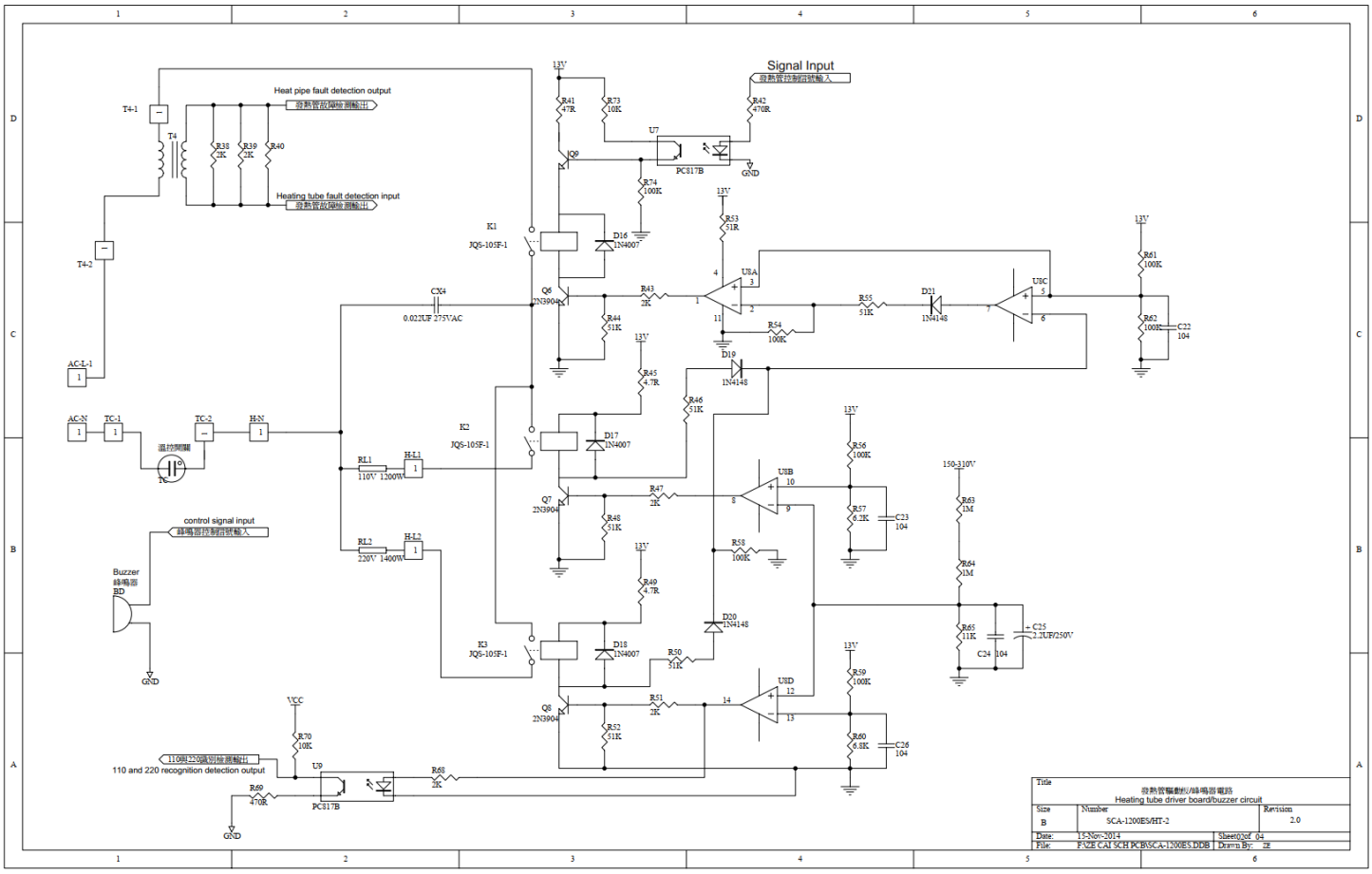
***EP**	Pump Motor malfunction/pump motor current fault.	(**See Pump and Transformer Troubleshooting Section XIII A**).
***EH**	Heater current fault	(**See Heater Element Troubleshooting Section XIII B**).
ES	12VDC out of range, power supply error for the display	(**See No Power to Display Troubleshooting Section XIII F**).
EO	Over temperature	The temperature of water exceeds set temperature by more than 5 degrees Celsius. This can be caused by an exothermic reaction to soluble cleaning solutions. Let the tank return to its set temperature. Error will not re-set until SCA is powered down. (**See Temperature Sensor Troubleshooting Section XIII C**).
r1	Temperature Sensor failure	The Control Panel detects very high resistance on the sensor. (**See Temperature Sensor Troubleshooting Section XIII C**).
r2	High Water Level Sensor failure	The Control Panel detects very high resistance on the sensor. (**See Water Level Sensor Troubleshooting Section XIII D**).
r3	Low Water Level Sensor failure	The Control Panel detects very high resistance on the sensor. (**See Water Level Sensor Troubleshooting Section XIII D**).

*****Only displayed on the original display controller *without* the "No Heat" option

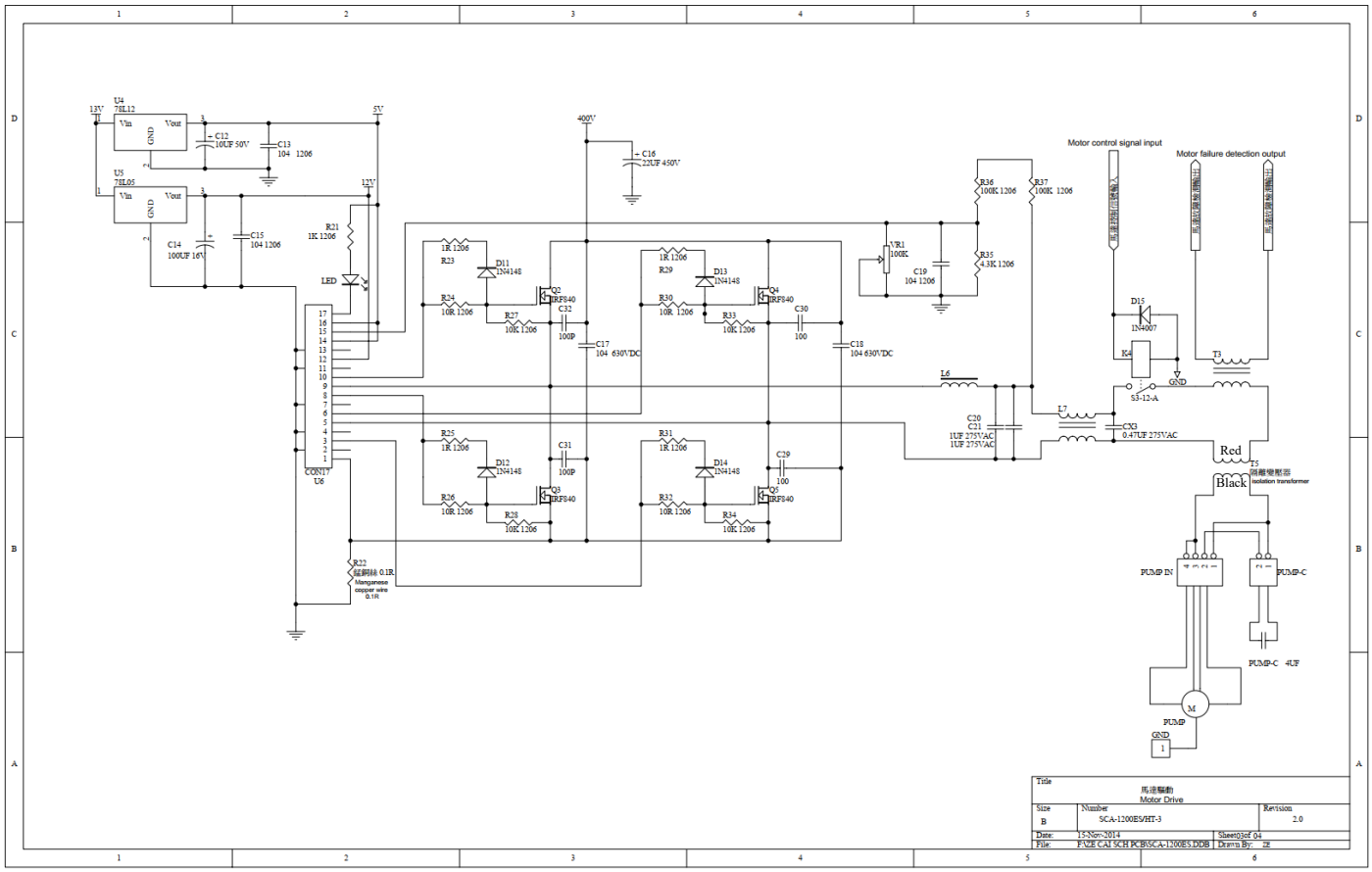
B. Schematics



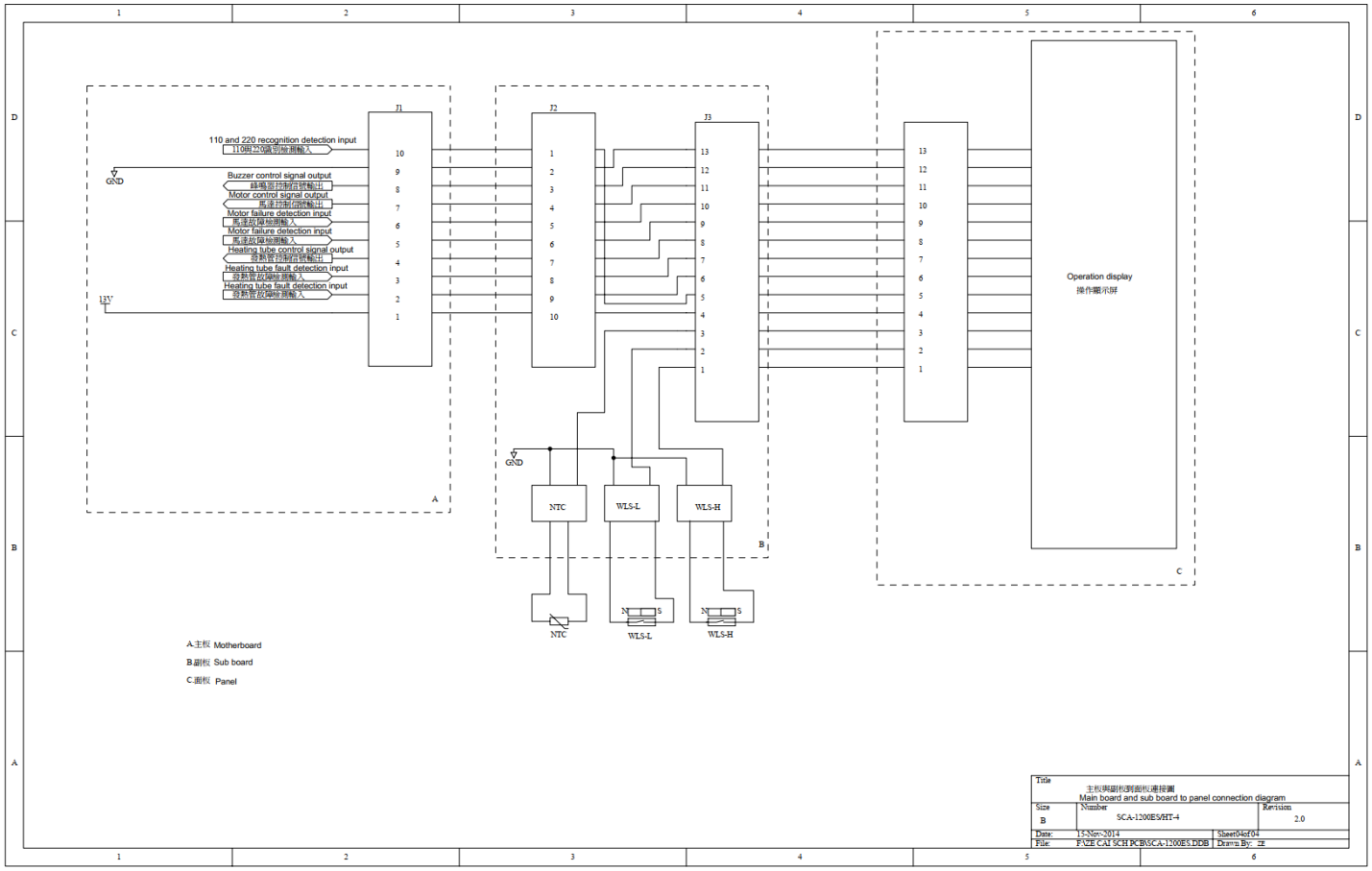
Power Circuit



Heating Elements Driver / Buzzer Circuit

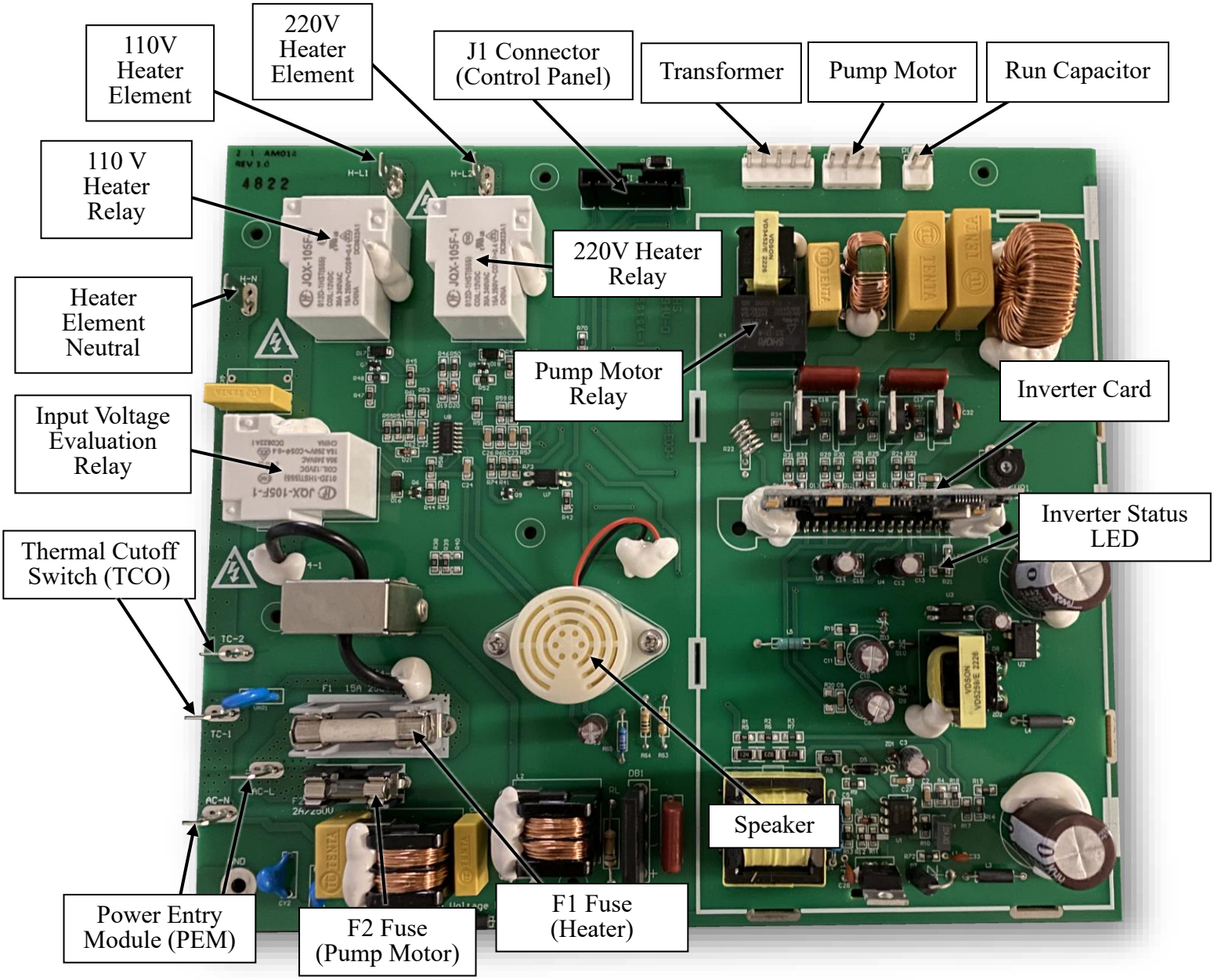


Pump Motor Driver



Main board and Connector board to panel connection diagram

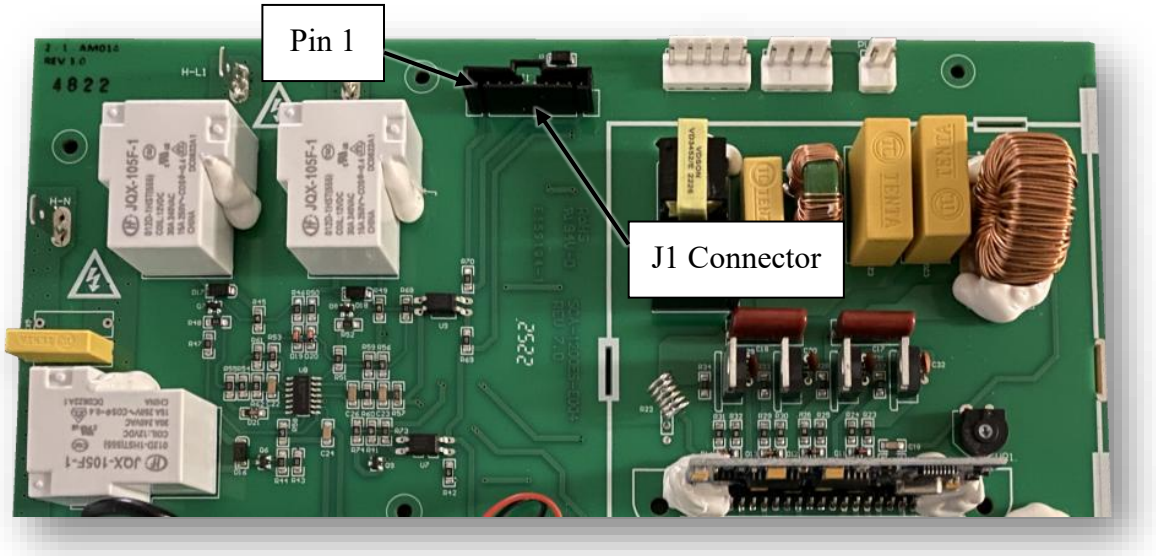
C. PCB Layout


110V Heater Element
220V Heater Element
J1 Connector (Control Panel)
Transformer
Pump Motor
Run Capacitor
110 V Heater Relay
220V Heater Relay
Heater Element Neutral
Pump Motor Relay
Inverter Card
Input Voltage Evaluation Relay
Inverter Status LED
Thermal Cutoff Switch (TCO)
Speaker
Power Entry Module (PEM)
F2 Fuse (Pump Motor)
F1 Fuse (Heater)

D. Control Panel Cable Connectors (J1)

- Low → ~0V DC
- High → ~12V DC

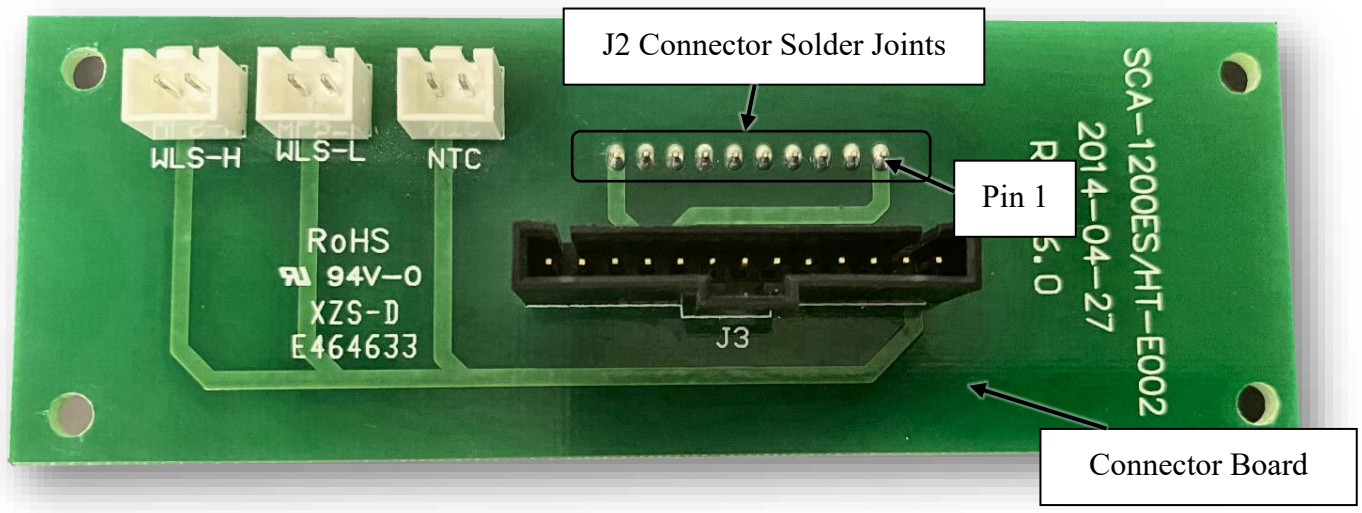
J1 Connector (PCB)			
Pin	**Description**	**Low**	**High**
1	12V DC	Power off	Power On
2	Heating tube fault detection input	No Fault	Fault
3	Heating tube fault detection input	No Fault	Fault
4	Heating tube control signal input	Heater Enable Off	Heater Enable On
5	Pump Motor failure detection input	No Fault	Fault
6	Pump Motor failure detection input	No Fault	Fault
7	Pump Motor control signal output	Pump Enable Off	Pump Enable On
8	Buzzer control signal output	Buzzer Off	Buzzer on
9	DC Ground	NA	NA
10	110V and 220V recognition detection input		110V AC Applied



E. Control Panel Cable Connectors (J2)

- Low → ~0V DC
- High → ~12V DC

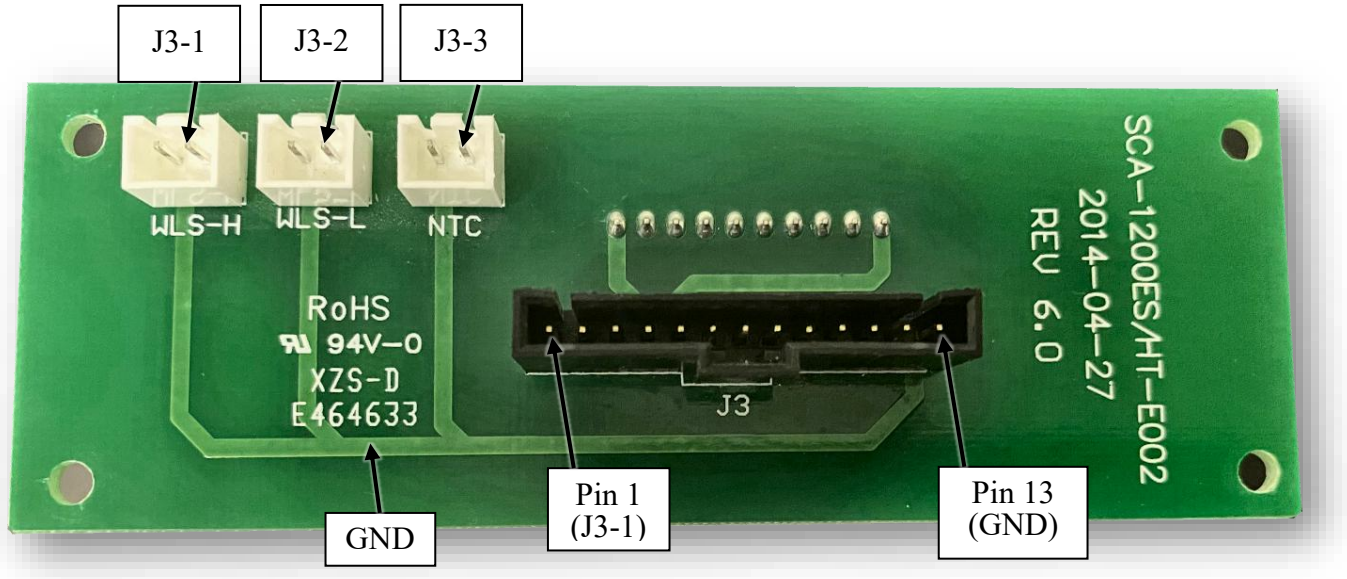
J2 Connector (Connector Board)			
Pin	**Description**	**Low**	**High**
1	110V and 220V recognition detection input		110V AC Applied
2	DC Ground	NA	NA
3	Buzzer control signal output	Buzzer Off	Buzzer On
4	Pump Motor control signal output	Pump Enable Off	Pump Enable On
5	Pump Motor failure detection input	No Fault	Fault
6	Pump Motor failure detection input	No Fault	Fault
7	Heating tube control signal input	Heater Enable Off	Heater Enable On
8	Heating tube fault detection input	No Fault	Fault
9	Heating tube fault detection input	No Fault	Fault
10	12V DC	Power Off	Power On



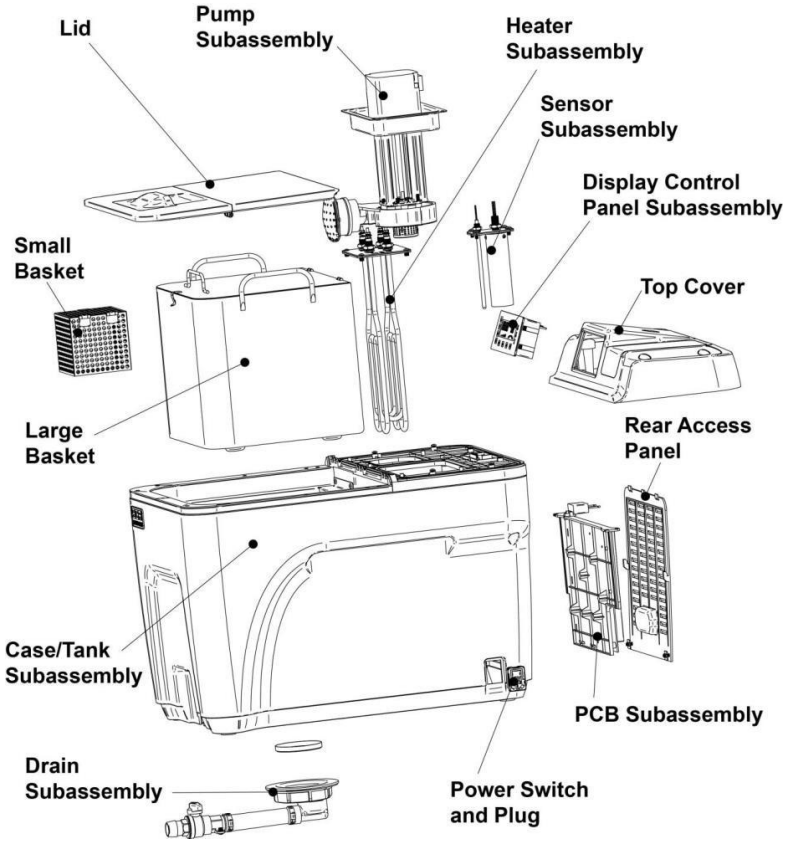
F. Control Panel Cable Connectors (J3)

- Low → ~0V DC
- High → ~12V DC

J3 Connector (Connector Board)			
Pin	**Description**	**Low**	**High**
1	Water Level High Sensing	NA	NA
2	Water Level Low Sensing	NA	NA
3	Temperature Sensing	NA	NA
4	Display VCC ~12V DC	Power Off	Power On
5	110V and 220V recognition detection input		110VAC
6	Heater Malfunction Sensing	No Fault	Fault
7	Heater Malfunction Sensing	No Fault	Fault
8	Heater Control	Heater Enable Off	Heater Enable On
9	Pump Motor Malfunction Sensing	No Fault	Fault
10	Pump Motor Malfunction Sensing	No Fault	Fault
11	Pump Motor Control	Pump Enable Off	Pump Enable On
12	Buzzer control signal output	Buzzer On	Buzzer Off
13	DC GND	NA	NA



G. Commonly Used Parts



Part Description	Part Number
Large Basket	04812-01
Small Parts Basket	04098-01
Pump Assembly w/nozzle	04803-01
Heater Assembly	04805-01
Sensor Assembly	04810-01
Display Control Panel	100039
PCB Assembly	04807-01
Power Switch (PEM)w/wiring harness	04813-01
Spray Nozzle (Threaded)	04809-01 Rev A
Spray Nozzle (Bayonet)	04809-01 Rev B
Power Cord (North America)	04811-01
Power Cord (Europe)	04811-02

H. Specifications

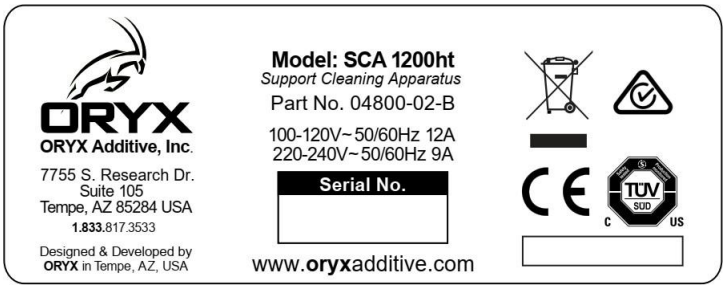
Item	Specification	
Model Number	**SCA 1200ht**	
Power Cord	110 North American	220 International
Power Requirements	100-120V~ 50/60 Hz 12A	220-240V~ 50/60 Hz 9A
Main Supply Voltage Fluctuation	+/- 10%	
Electrical Protection	15A/250VAC Fuse	
Heater Power	1,200 Watts	1,700 Watts
Regulatory Compliance	CE / cTUVus/ RoHS / WEEE	
Tank Capacity	12.2 Gallons / 46.3 Liters	
Physical Dimensions	26L x 17.5W x 20.5H inches / 66 x 44.5 x 52 cm	
Shipping Package Dimensions	29.5 x 21.8 x 24.8 inches / 75.0 x 55.4 x 63.0 cm	
Weight, Shipping Max	NW: 64 lbs / 29 kg GW: 75 lbs / 34 kg	
Large Parts Basket Capacity	10 x 10 x 12 inches / 25 x 25 x 30 cm	
Small Parts Basket Capacity	4 x 4 x 4 inches / 10 x 10 x 10 cm	
Operating Environment Ranges	Temperature: 5ºC - 40ºC Humidity: 0% - 80% RH Altitude: 0 M – 2000 M	
Temperature Control Accuracy	± 2ºC	
Pump Max Flow Rate	10 GPM / 38 LPM	
Temperature Display	Digital LED Readout	
Timer Display	Digital LED Readout	
Liquid Level Checking	Fixed liquid level sensors with separate lamp indicators for high and low level and audible alarm for both.	
Temperature Checking	Over temperature sensor, alerts at 5°C above the set temperature, audible alarm and lamp indicator. Thermal cutoff factory set at 90°C.	
Pump and Heater Safety Lockouts	Low liquid level, high liquid level, over temperature, no time on timer.	
Ventilation Requirements	Must be operated in a well-ventilated space	
Measurement (Installation) Category:	Installation Category II	
Pollution Degree	2	
Protection Class	Class I	
Marked Degree of protection for IEC	For Indoor Use Only, IP20	

Specifications are subject to change without notice.

I. Technical Support

Technical support for this product is provided by **Oryx Additive, Inc.** Before contacting Technical Support, please do the following:

1. Try the Quick Troubleshooting table at the beginning of this manual.
2. View the Troubleshooting Steps in this manual. This manual can also be found at **www.oryxadditive.com/support**. Click on the 1200ht model and scroll down to select the sca1200ht Repair Manual. This manual may be updated regularly, please check for a newer version.
3. If Technical Support is needed, write down the SCA model number, part number, and serial number (found on the back of the unit).



If the unit is covered by an extended warranty, contact the Authorized Reseller from whom the unit was purchased. Otherwise, to receive technical support do one of the following:

1. Go to **www.oryxadditive.com/contact**. Fill out the "Request More Information" form and click SUBMIT
2. Send an e-mail to: **support@oryxadditive.com**.
3. Call **1-833-817-3533** and ask for SCA Technical Support.

Please include your full name, company name, phone number and SCA model and serial number.

Replacement and Accessory Parts

Parts can be ordered through our online store or by contacting Technical Support. It is highly recommended Technical Support be contacted prior to ordering parts online to ensure the correct part is ordered to fix the specific issue.

- Visit our online store at: **https://www.oryxadditive.com/store/** Select "Parts & Accessories" and choose the model of the SCA needing parts.
- Send an email to **support@oryxadditive.com.**
- Call **1-833-817-3533** for information on obtaining replacement parts.

Regulatory Compliance Documents

Visit our website at **www.oryxadditive.com/products/sca1200ht** for the latest regulatory compliance certificates.

J. Supplemental Information

SCA 1200ht Support Cleaning Apparatus Limited Warranty

Product	Limited Warranty Period
SCA 1200ht Support Cleaning Apparatus	1 year

All new Support Cleaning Apparatus (SCA) systems are warranted exclusively by Oryx Additive, Inc.'s ("Manufacturer") limited warranty as follows:

Each Support Cleaning Apparatus system ("System") and its components ("Components"), except those listed below under limits and exclusions, is warranted against defects in the materials and workmanship for a period of one (1) year from the date of installation at the end user's ("Customer") facility.

Repair or replacement only: manufacturer's liability under this agreement shall be limited to repairing or replacing, at the discretion of manufacturer, parts, or components sufficient to return the system to conform to the marketing specifications of the system.

Components subject to wear during normal use and over time such as paint, finish, light bulbs, seals, etc., are excluded from this warranty.

This warranty is void if the system is subjected to mishandling, misuse, neglect, accident, improper installation, improper maintenance, or improper operation or application, or if the machine was improperly repaired or serviced by the customer. This warranty is void if the system is not installed by a certified distributor and the proper installation documentation provided by the manufacturer has not been submitted.

Liability, whether based on warranty, negligence or other cause, arising out of and/or incidental to sale, use or operation of the system, or any part thereof, shall not in any case exceed the cost of repair or replacement of the defective equipment, and such repair or replacement shall be the exclusive remedy of the purchaser, and in no case will manufacturer be responsible for any and/or all consequential or incidental damages including without limitation, and/or all consequential damages arising out of commercial losses.

This warranty is transferrable from the original end user to another party if the machine is sold via private sale before the end of the warranty period.

The foregoing is a limited warranty and it is the only warranty by manufacturer. MANUFACTURER DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ALL WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.