

Troubleshooting

**The 9400 Series
Spa Controls System**



HYDROQUIP™

THE **SMART** CHOICE™

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Preparing for the Job

This Troubleshooting Manual has been designed for easy simple step-by-step problem solving and fault isolation.

It is important to identify all of the possible causes of the problem before making a final diagnosis. What you see at first is usually a symptom of the problem, not necessarily the problem itself.

Read the entire troubleshooting procedure related to what you are testing for prior to performing the test. This will give you a clearer overall view and help to avoid a mis-diagnosis.

Prepare for the service call. Make sure you have the right tools.

Tools for the Job:

- Multi-Meter and Clamp-On Ammeter
- Jumper Cable
- Accurate Thermometer
- Standard & Philips Screwdrivers
- 1/4 in. & 3/8 in. Open-End Wrench
- 11/32 in. Nut Driver
- GFCI Tester (optional)



Spare Parts to Bring:

- Spaside Control
- Temperature Sensor
- High-Limit Sensor
- Fuses
- Printed Circuit Board
- Heater Element

Prior to the service call, have the homeowner check the following:

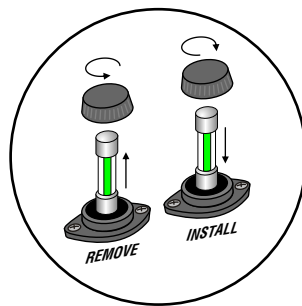
- Make sure spa has been filled to the water level suggested by the spa manufacturer.
- Insure that all water shutoff valves are open and are not vibrating closed.
- Adjust diverter valves and/or jets to allow adequate back pressure to heater assembly.
- **If 3 flashing dots appear on the spaside control display:**
Have the homeowner remove the filter and operate system. If the error goes away, a filter cleaning is required. The filter may not look dirty, we are dealing with oils, lotions etc... Use an appropriate filter-cleaning agent.
- Get data label information from the spa control box. This provides specific information as to when and how the system was built.

Getting Started - VDS (Visual Diagnostic System)

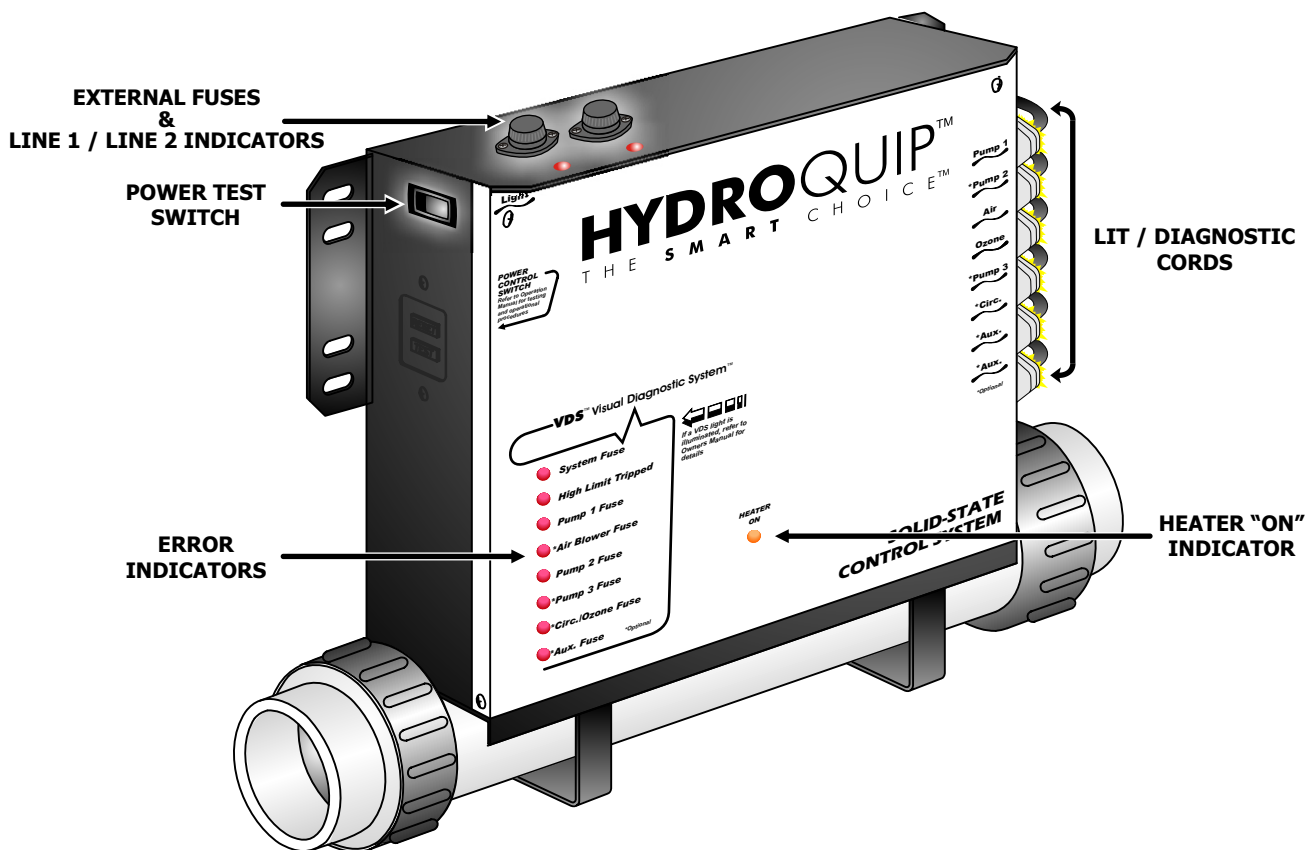
Equipped with exclusive VDS™ (Visual Diagnostic System) by Hydro-Quip, Troubleshooting can be done at glance. Once the spas equipment compartment has been accessed, check to see if a VDS indicator has been illuminated. The description of that indicators function is printed on the faceplate. Simply go to that section and start from there.

With VDS you can see if a fuse has blown, check incoming power (optional) and verify that the heater has been activated. If equipped with our exclusive line of lighted cords, you can verify component power supply (single or dual speed). Other optional features include externally mounted fuses.

System circuitry may vary and some options may not have been included with the particular control you are servicing.



WARNING - Remove power prior to changing a fuse.

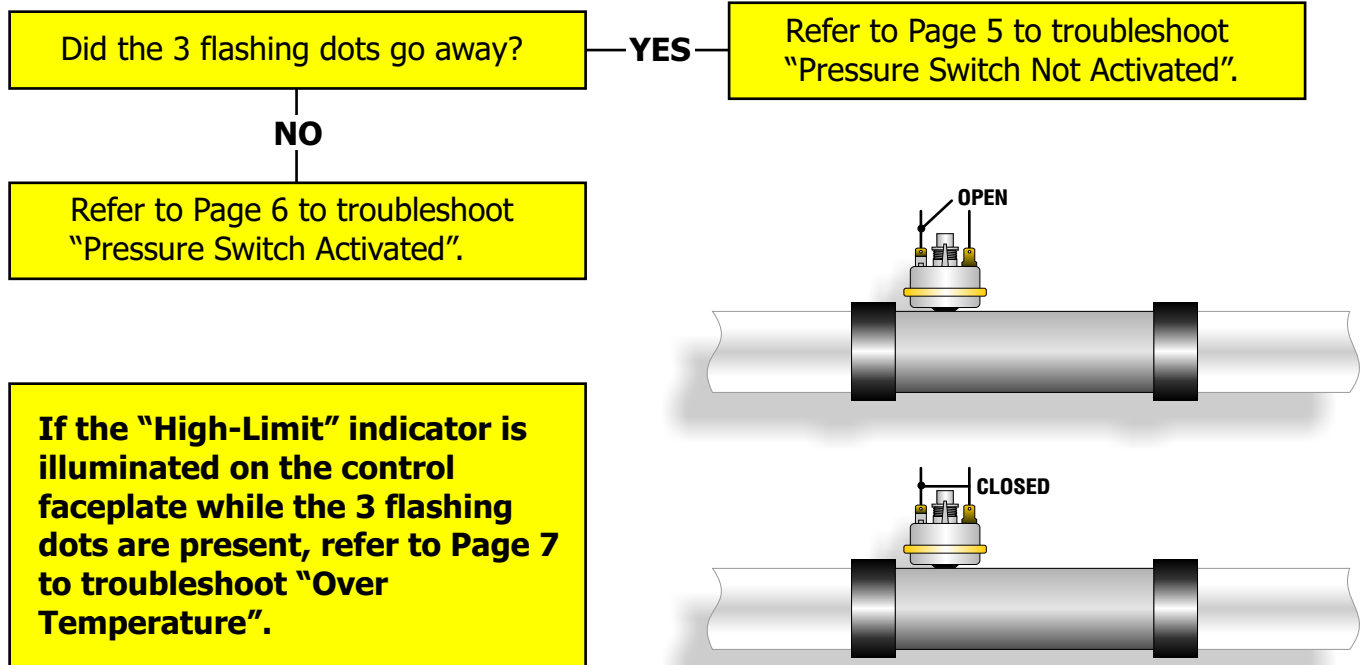


Error Identification - 3 Flashing Dots

If "3 Flashing Dots" appear below the spaside time/temperature display, this is an indication that a system error has occurred. Possible causes for this error will be:

- A)** - the system has started (low speed pump) but the pressure switch has not closed. The heater will not activate, pressure switch adjustment may be necessary.
- B)** - the system has not yet been started but the pressure switch is closed. The heater will not activate, pressure switch adjustment may be necessary.
- C)** - there has been a "High-Temperature" condition detected. "3 flashing dots" with the "High-Limit Tripped" indicator illuminated lets you know the spa water temperature has been/or is currently above the normal usage parameters. To properly identify which, perform the following tests:

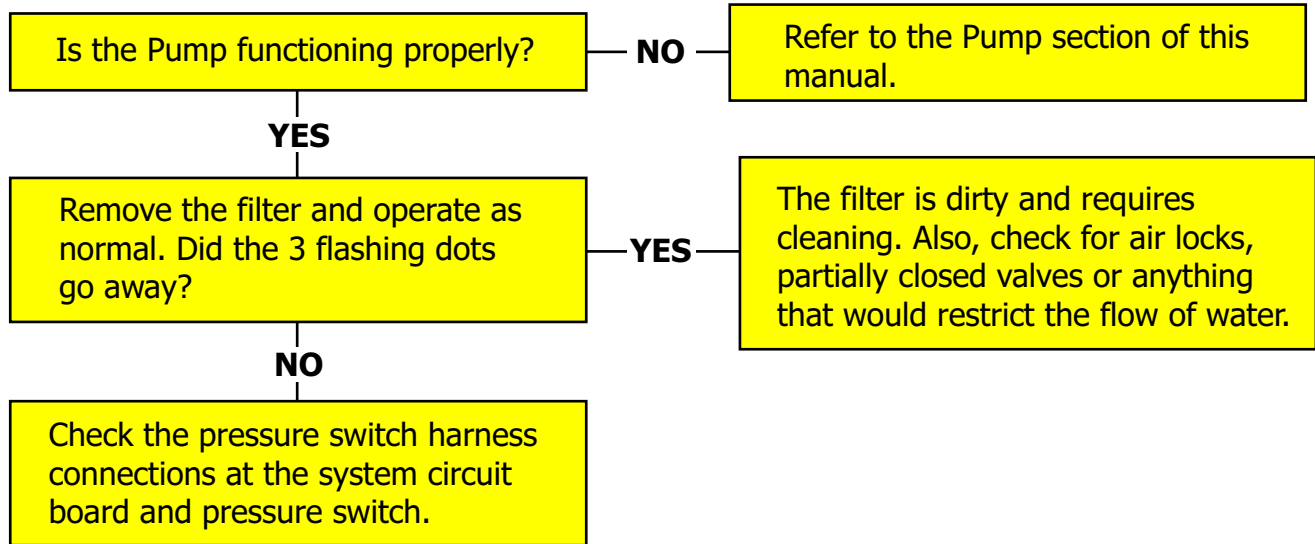
Turn the pump(s) off manually by pressing the Down Arrow key to lower the temperature to its lowest setting or by pressing the Pump 1 (and/or Pump 2) key. If the heater was activated at any time during startup, there is a 20-second cool down cycle, so the pump will continue to run until this cycle has ended.



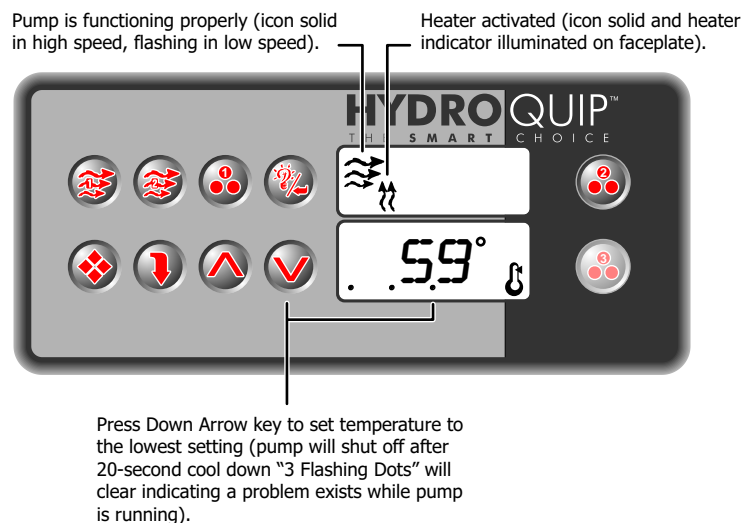
Error - Pressure Switch Not Activated

With the pump(s) operating properly and "3 Flashing Dots" showing on the spaside control you've narrowed the problem down to the pressure switch. Perform the following tests to be sure that you have properly diagnosed the problem:

Note: There must be enough water in the spa for normal use. This error can also be caused by a restricted flow of water caused by debris caught in the plumbing. If the spa was just filled, there may be an air trapped in the pump(s). The heater will not activate while this error is displayed.

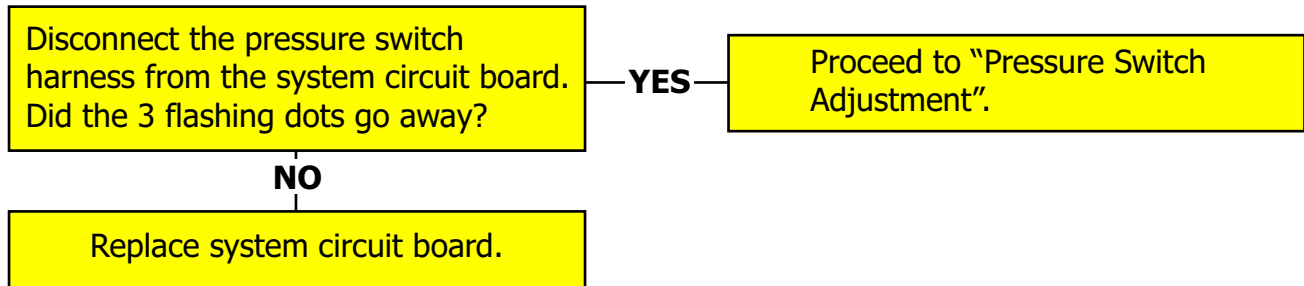


If you've verified that the pump(s) is functioning properly, the filter is not dirty, water shutoff valves are open, there is no debris in the plumbing causing a restricted flow of water and that all connections are secure, the pressure switch requires adjustment. **Refer to page 6 for pressure switch adjustment.**



Error - Pressure Switch Activated

With the pump(s) turned off and "3 Flashing Dots" showing on the spaside display, perform the following tests to be sure that you have properly diagnosed the problem:



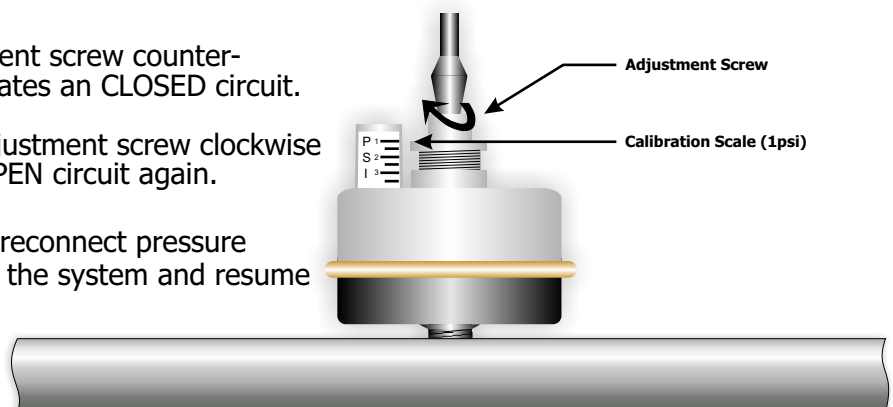
Pressure Switch Adjustment

If your system is equipped with a pressure switch, the function of the pressure switch is to turn the heater off if the pump stops operating or if there is a restricted water flow (dirty filter, obstruction in the spa plumbing etc.).

The pressure switch has been preset at the factory to operate properly with your spas specific plumbing. Adjustment or other service may be required if you observe a flow related problem (3 flashing dots on spaside display). If adjustment is required, follow the next steps carefully.

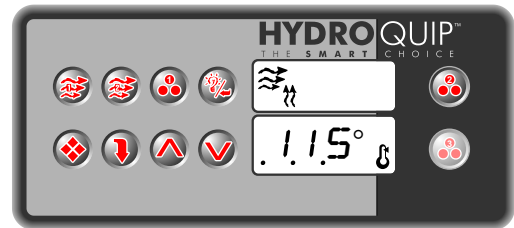
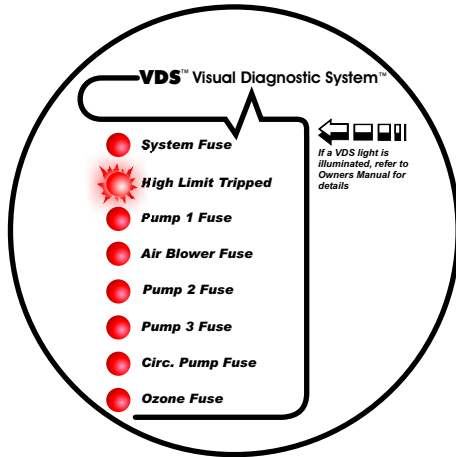
IMPORTANT: After any pressure switch adjustment, it is important to test the control by turning on the pump low speed and heater. While operating, unplug the pump, the heater must turn off. If the heater stays on, plug the pump back in and readjust the pressure switch to achieve proper operation.

- 1) With power to system turned OFF, remove the wires from the pressure switch terminals (secure wires safely to prevent any chance of electrical shock).
- 2) Turn power to the system ON. If system automatically starts in low speed, press Down Arrow key to set temperature to its lowest setting (pump will turn off after cool down cycle if the heater has been activated).
- 3) Place an Ohmmeter across the pressure switch terminals to verify an OPEN circuit.
- 4) Rotate the pressure switch adjustment screw counter-clockwise until the Ohmmeter indicates a CLOSED circuit.
- 5) Then rotate the pressure switch adjustment screw clockwise until the Ohmmeter indicates an OPEN circuit again.
- 6) Turn power to the system OFF and reconnect pressure switch terminals. Reapply power to the system and resume normal operation.



Error - Over Temperature

If "3 Flashing Dots" appear in the spaside display window while the High-Limit Tripped indicator is illuminated on the control faceplate, an overheat condition has been detected. It is not safe to enter the spa until this error has been corrected.



If the water temperature exceeds 112°F at the systems temperature sensor (located in a plumbing dry-well or in wet-well in the spa) the system will shut off the heater and all other outputs will be disabled (pump(s), blower etc.) until the water temperature drops below 110°F.

If the water temperature exceeds 119°F at the systems high-limit sensor (clamped to the stainless steel heater assembly) the system will shut off the heater only after the water temperature drops below 110°F. The pump(s), blower and other outputs will stay active.

- Carefully check the heater housing first to see if it is hot to the touch. If it is there may be an obstruction in the plumbing, a dirty filter or closed water shutoff valve. **Power must be cycled off then back on for the system to reset this error.** *This can be done at the main breaker if your system does not include a power switch.*
- Check the water temperature with an accurate thermometer. If the temperature displayed on the spaside control greatly differs, the temperature sensor may not be fully inserted into the wet-well or may be defective. Inspect the sensor's circuit board connection (straighten and/or clean pins if needed). If this does not correct the problem, replace the sensor. (Remember to reset power to clear the error)
- If the weather is extremely hot, remove the spa cover. Running the blower may help cool the water. Add cold water if necessary. (Remember to reset power once the water has cooled)
- Lower the systems set temperature by pressing the Down Arrow key, the "Heater On" indicator should go out. If the indicator stays on after the water has cooled and the system has been reset, replace the system circuit board.

Error - Over Temperature (cont.)

- If the "Heater On" indicator did in fact go out, the pump may be overheating the spa. Lower the duration of the filter cycle as follows:

Press and hold the Program key for 5-seconds or until "CL" appears in the spaside display. Continue to press the program key until "Fdu 1" appears. This is the duration the spas filter 1 cycle will run. Press the Light/Enter key to access and modify this setting. Use the Down Arrow key to lower the number, which represents the number of hours the filter cycle will be active twice a day. Once the setting has been sufficiently lowered, press the Program key to confirm the change. The display will then revert back to the standard Time/Temp. Repeat above steps, if necessary, on filter cycle #2 ("Fdu 2").


It may be necessary to insulate around a temperature or high-limit sensor that is being adversely affected by the ambient (outside) temperature.

Error - Temperature Sensor

If the spaside display shows a constant 32°F or 122°F, the temperature sensor has failed. Check the sensors circuit board connection (clean or straighten pins if necessary). If the problem is not resolved the temperature sensor must be replaced.

Freeze Protection

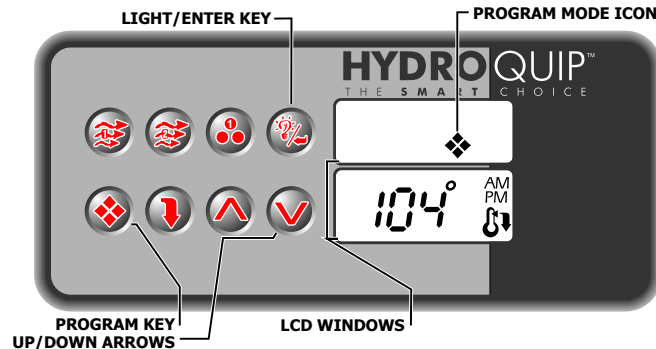
The system is constantly monitoring the temperature with its high-limit and onboard (circuit board mounted) sensors. If the onboard sensor registers an ambient temperature below 59°F, the systems "Smart Winter Mode" will activate. This mode, once activated, will continue for a period of 24-hours. The system will activate any pump connected to the system, that has not been turned on in the last 2-hours, for 1-minute to prevent freezing. The frequency of this cycle may increase as the ambient temperature drops.

During the "Smart Winter Mode" the filter cycle icon  will flash while the pump(s) is running in this mode.





If the customers complaint is that the spa is running every 2-hours, as if it has a mind of its own, it does and in colder weather this is a safety feature designed to protect the spa.

Standard Programming

During your troubleshooting process, you may find it necessary to access the "Standard Programming" (customer level) to verify or change settings. Follow the procedures below:



To Access & Adjust "Standard Programming":

- Press and hold the  Program key for approximately 5-seconds. The "Program" icon will appear.
- The first parameter is the time setting. The time will appear with the hour flashing.
- Use the   Up & Down Arrow keys to increase or decrease the setting.
- Once the desired setting has been achieved, press the  Program key to save the change and move onto the next parameter. **(See settings below)**

Time of Day: This is the first parameter and will appear with the hour flashing. Use the Up or Down Arrow keys to adjust the hour from 00: to 11:. Press the Program key again to adjust minutes, use the Up or Down Arrow keys to adjust the minutes from :00 to :59. Press the Program key to confirm the new setting and move to the next parameter to be programmed.

Filter Cycle Start Time: ("FS XX") appears in the display (X represents setting). Use the Up or Down Arrow keys to adjust the hour from 00 to 11. The filter cycle runs every 12-hours (twice a day) at the time chosen. Press the Program key to confirm the new setting and move to the next parameter to be programmed.

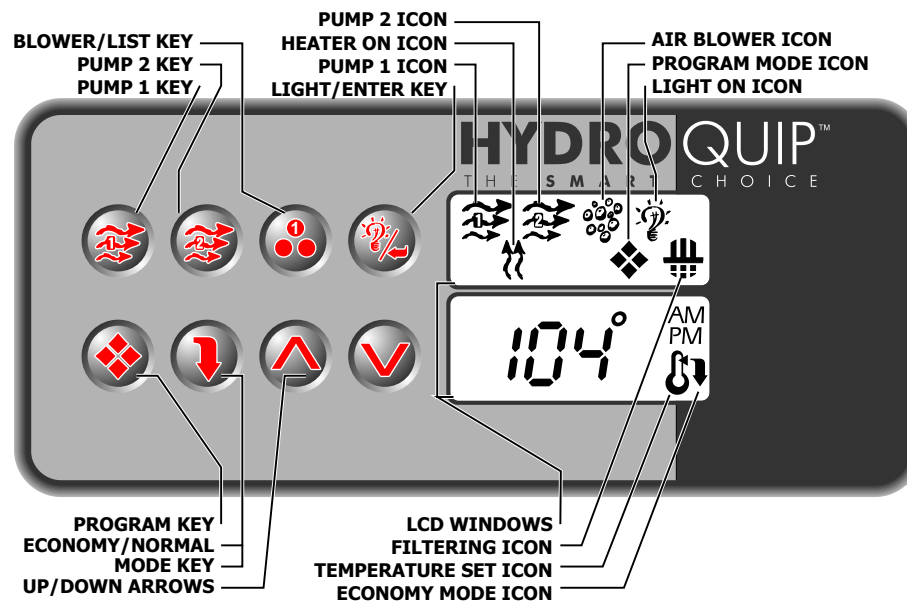
Filter Cycle Duration: ("Fd XX") appears in the display (X represents setting). Use the Up & Down Arrow keys to adjust from OFF (always off) to 12 (always on). Press the Program key to confirm the new setting and move to the next parameter to be programmed.

Filter Cycle Frequency: ("FF XX") appears in the display (X represents setting). Use the Up & Down Arrow keys to adjust from 1 (once a day) to 4 (will run every 6-hours). Press the Program key to confirm the new setting. Programming is complete, display will revert back to standard Time/Tempdisplay.




Low Level Programming

All of the circuits connected to the system are preprogrammed at the factory. Extreme weather conditions may cause this programming to be reset. If servicing a "Universal" model, the pump voltage may differ from the factory presets requiring these settings to be changed.

Often while troubleshooting the system, these settings will be referred to. You may only need to verify that the settings are correct. The following instructions will take you through accessing the "Low Level Programming", verifying settings, changing settings and saving those changes.



To Access "Low Level Programming":

- Press and hold the  Program key for 20-seconds. When you have successfully entered programming "P1 X" (X representing the setting) will appear. The first parameter being the Pump 1 setting.
- To change the setting (see following page for details) simply press the   Up or Down Arrow keys to increase or decrease the value.
- To save the change and move to the next parameter, press the Program key. **(You must go through all parameters to save changes and exit this mode)**
- Once you've gone through all of the programming parameters, a final press of the Program key will reset the spaside control and the standard (Time/Temp) display will appear.

Low Level Programming (cont.)

Programming Parameters and Internal Settings:

1 - PUMP #1 (main pump):

- Display: **P1 X**
- Setting for X: **1 = Single-Speed**
2 = Dual-Speed

2 - Pump #2 (jet pump):

- Display: **P2 X**
- Setting for X: **0 = Not Installed**
1 = Single-Speed
2 = Dual-Speed

3 - Blower:

- Display: **bL X**
- Setting for X: **0 = Not Installed**
1 = On/Off
2 = Dual-Speed
3 = Three-Speed

4 - Light:

- Display: **LI X**
- Setting for X: **0 = Not Installed**
1 = 12V - On/Off
2 = 12V - Two Intensities
3 = 12V - Three Intensities

5 - Ozone:

- Display: **O3 X**
- Setting for X: **0 = Not Installed**
1 = On with Filter Cycle
2 = Always On
3 = Programable*

6 - Circulation Pump:

- Display: **CP X**
- Setting for X: **0 = Not Installed**
1 = On 24-Hours *

* Shuts off when temperature is 4°F over set point

7 - Fiber Optic:

- Display: **AU X**
- Setting for X: **0 = Not Installed**
1 = Fiber Optic Ready

8 - High Current/Low Current:

- Display: **Cu X**
- Setting for X: **0 = Low Current (Heater off when both pumps are in high-speed)**
1 = High Current (No Limitation)

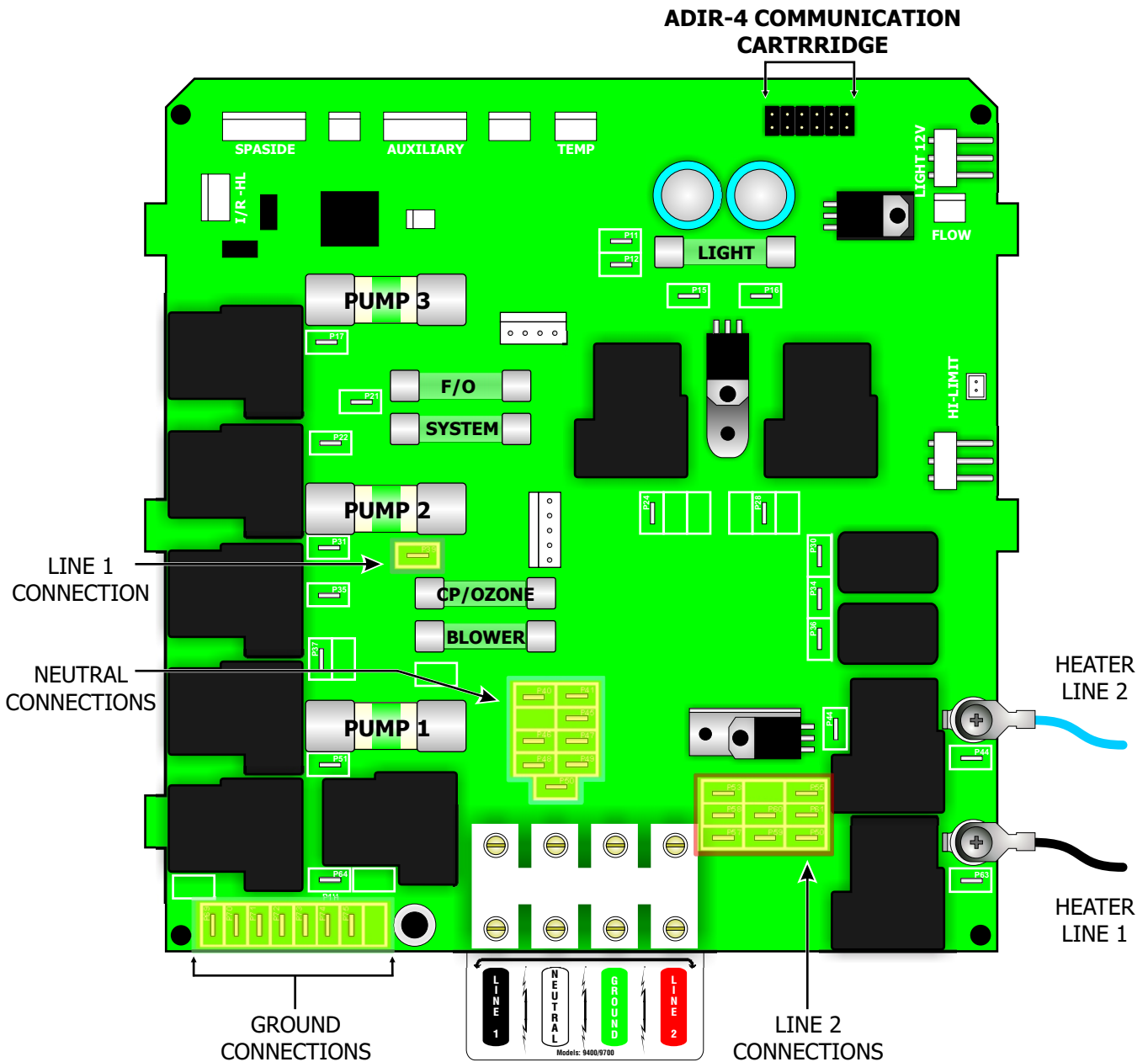
9 - Spaside Control:

- Display: **TC X**
- Setting for X: **0 = 8-Key Control**
1 = 10-Key Control

* When a Circ. Pump is used, you can then program the Ozonator to be turned on periodically to sanitize the water.

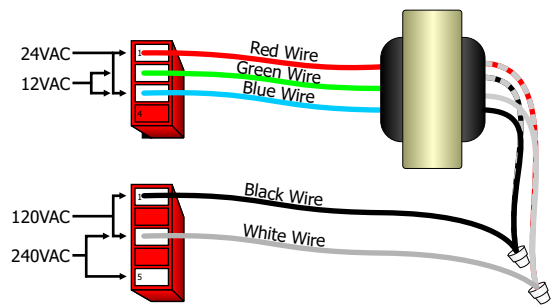
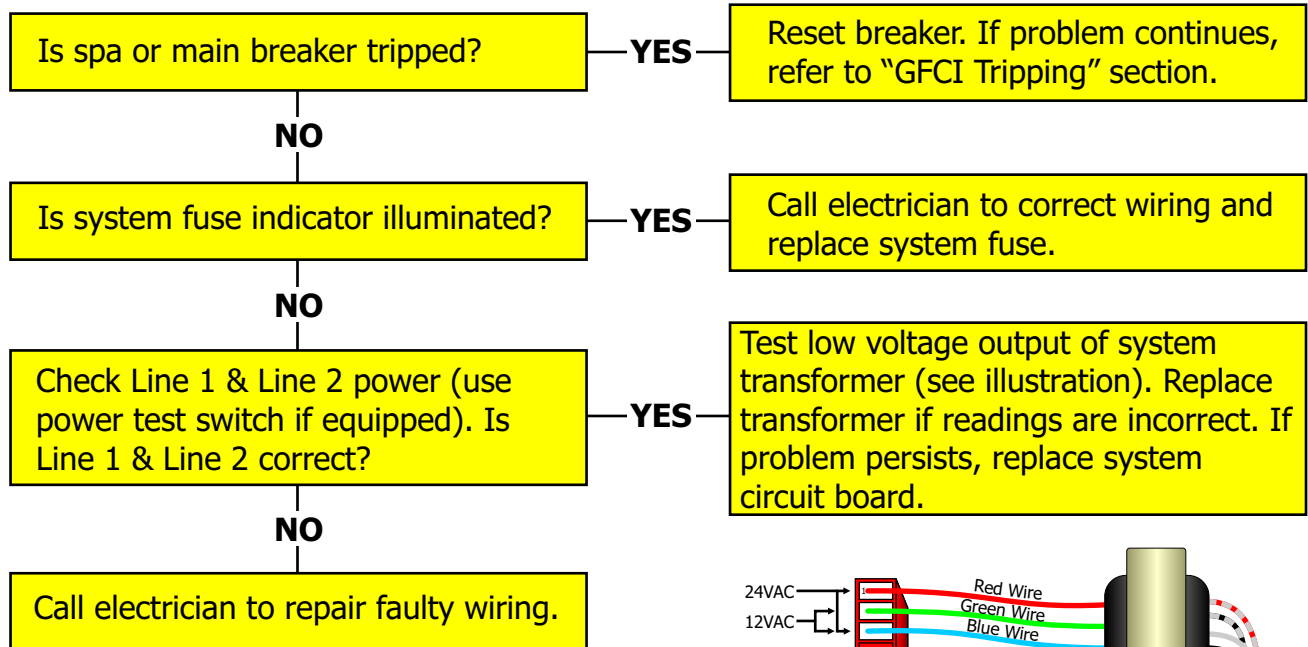
Circuit Board Layout

Throughout the troubleshooting process you will need to refer to this layout as a reference. To troubleshoot Universal Systems it is important to note that the neutral (white wire w/color coded connector) will ultimately determine that circuits voltage (connected to Neutral or Line 2). Always consult the system wiring diagram included with each control (located on the inside faceplate).



Nothing Works!

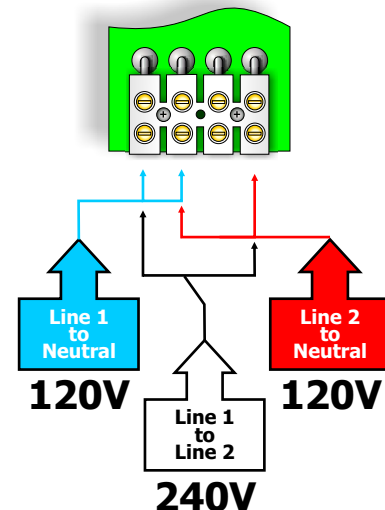
The following troubleshooting tree has been designed as a guideline to assist the technician with a quick diagnosis of the problem.



Power Test Switch and Indicators



For systems that do not include a "Power Test Switch", a voltage reading will need to be taken to confirm proper input power.



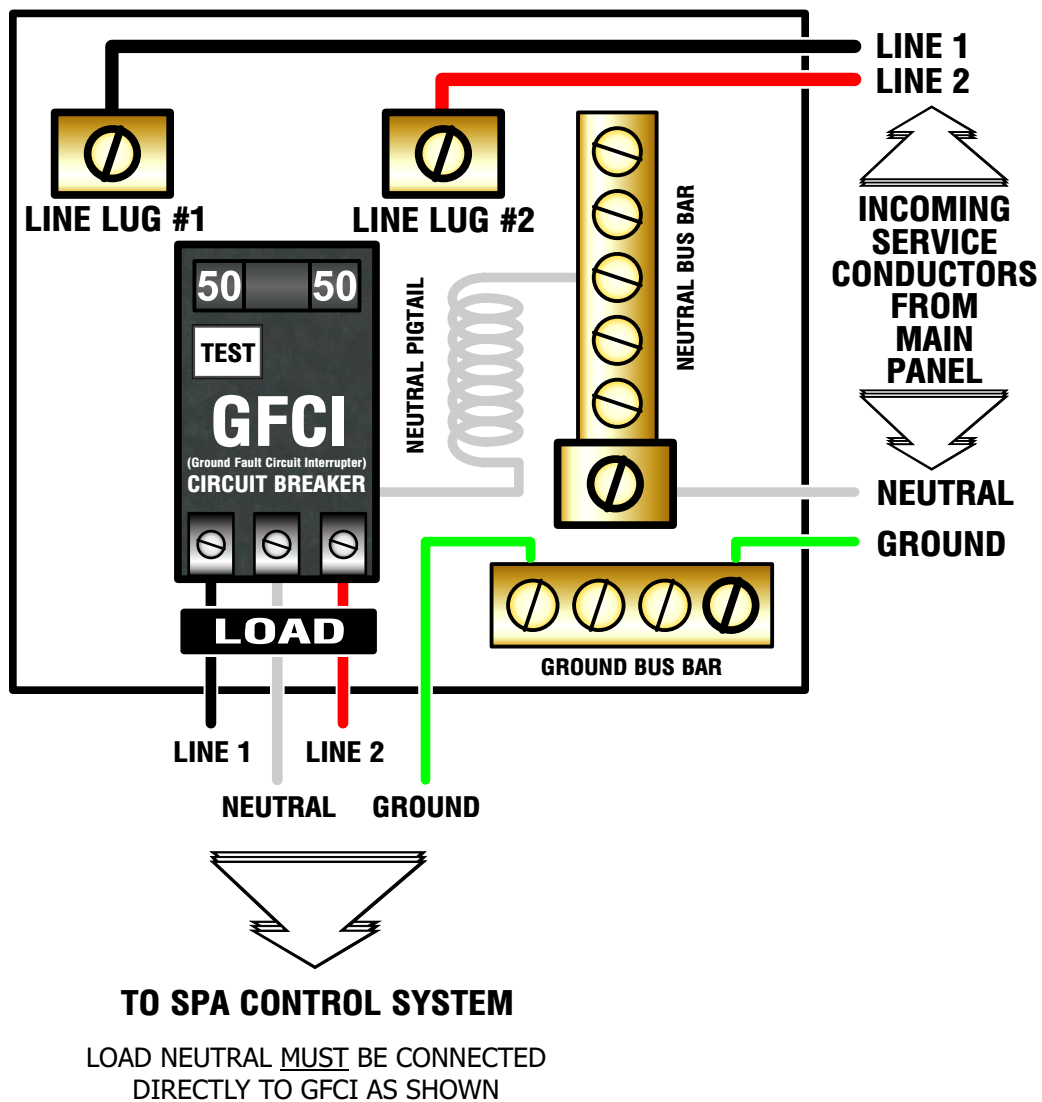
* Remove power to system prior to accessing the internal control wiring or before changing fuses.

GFCI Tripping!

When a GFCI circuit breaker is used in the installation of your spa, it is important that it has been properly installed. Often this component has been improperly installed causing the breaker to trip the instant the system is turned on. Below is an illustration of a typical GFCI breaker installation.

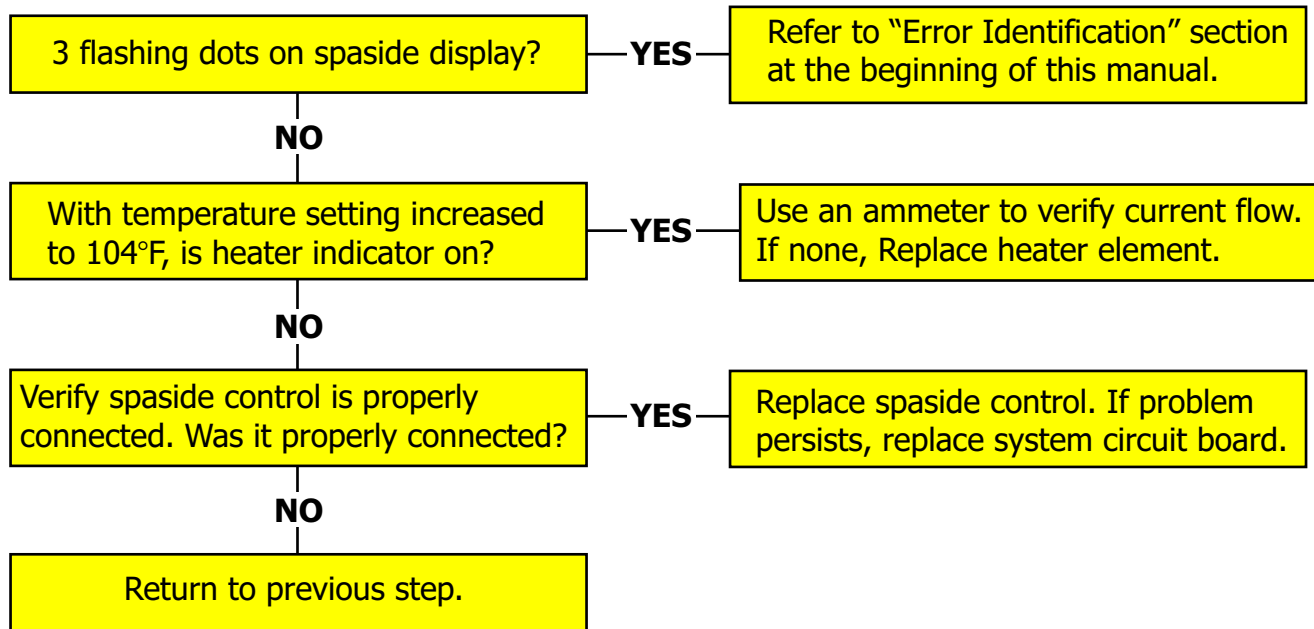
WARNING: Refer to Circuit Breaker Manufacturers installation instructions. This illustration is meant to be a guide for Field Technicians and is not intended to override or substitute the instructions supplied with the circuit breaker.

TYPICAL INSTALLATION



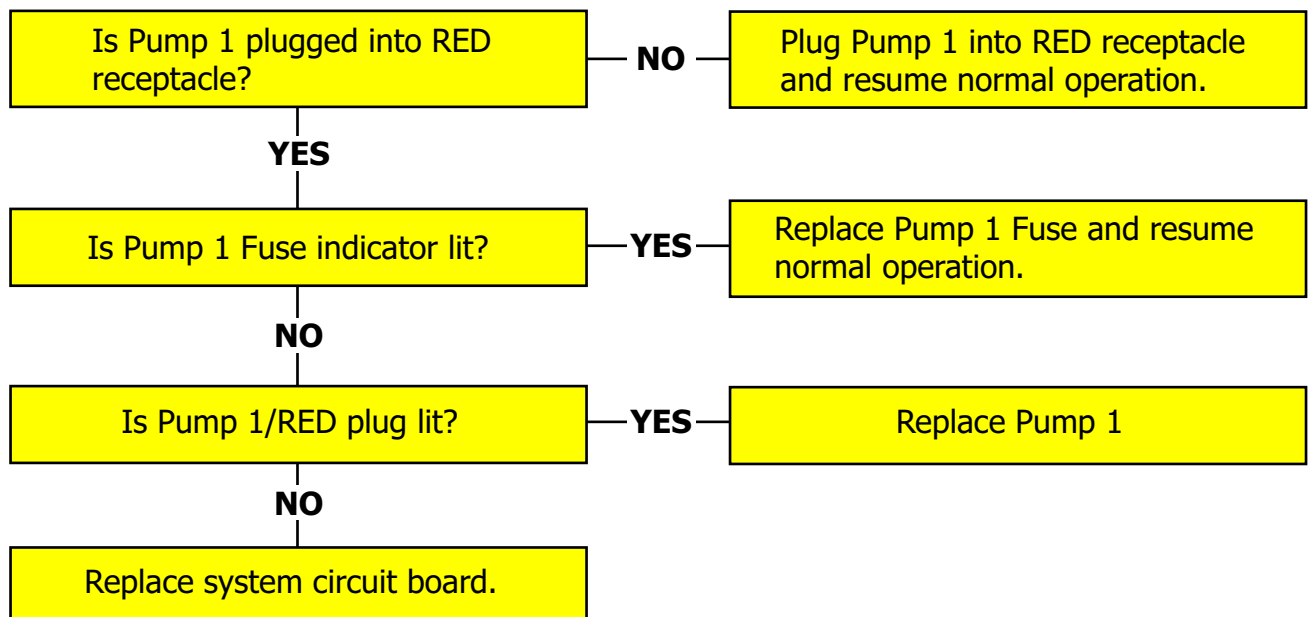
No Heat!

Press the Up Arrow key and increase the temperature to its highest setting. Verify that the heater indicator on the spaside control is illuminated.



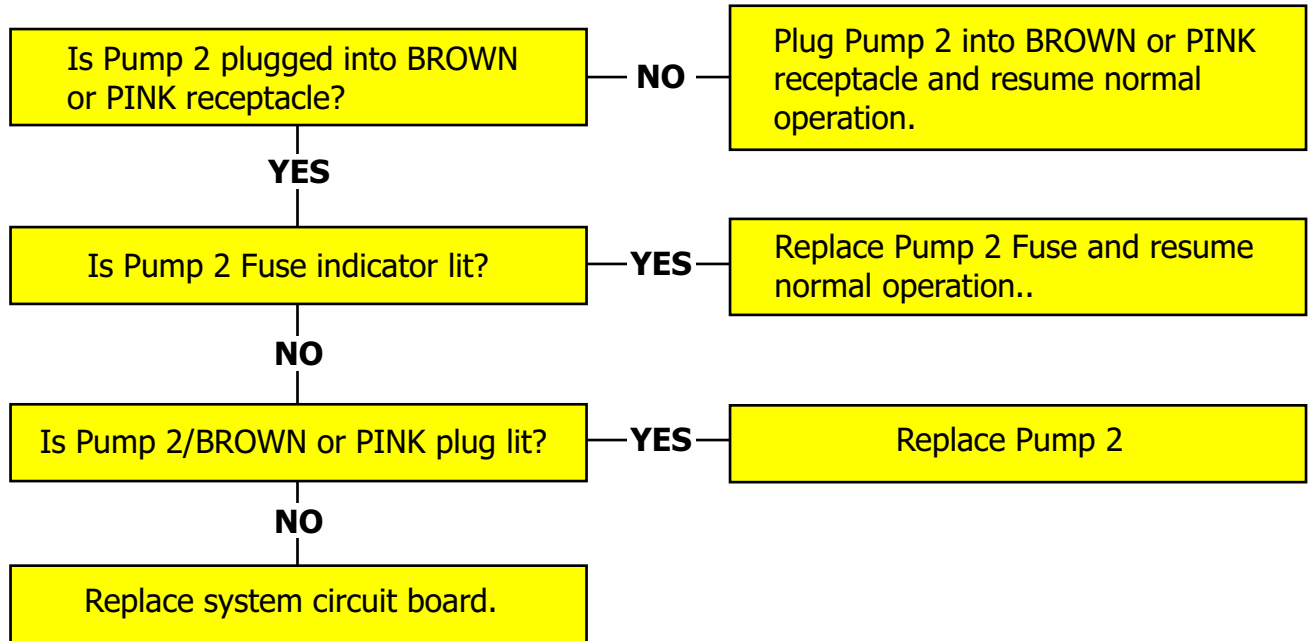
No Pump 1 !

It is uncommon for a pump to just fail. Keep in mind that improper wire and/or breaker size can cause premature failure. Press Pump 1 key, verify the Pump 1 icon appears in spaside display.



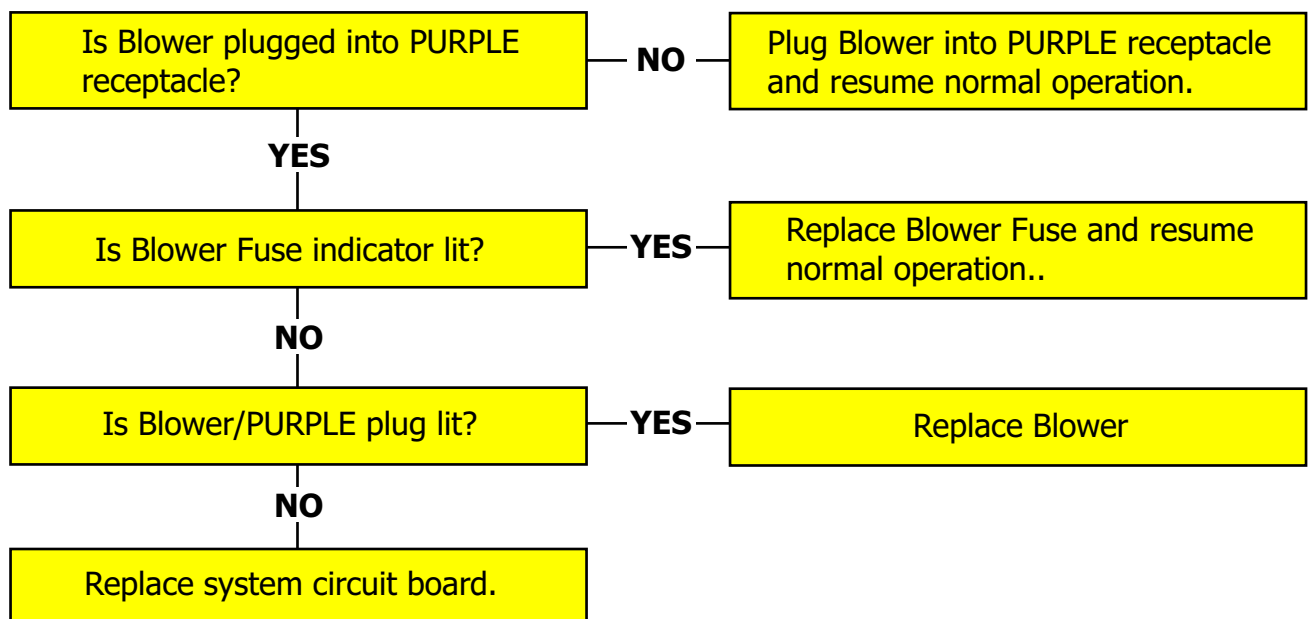
No Pump 2 !

It is uncommon for a pump to just fail. Keep in mind that improper wire and/or breaker size can cause premature failure. Press Pump 2 key, verify the Pump 1 icon appears in spaside display.



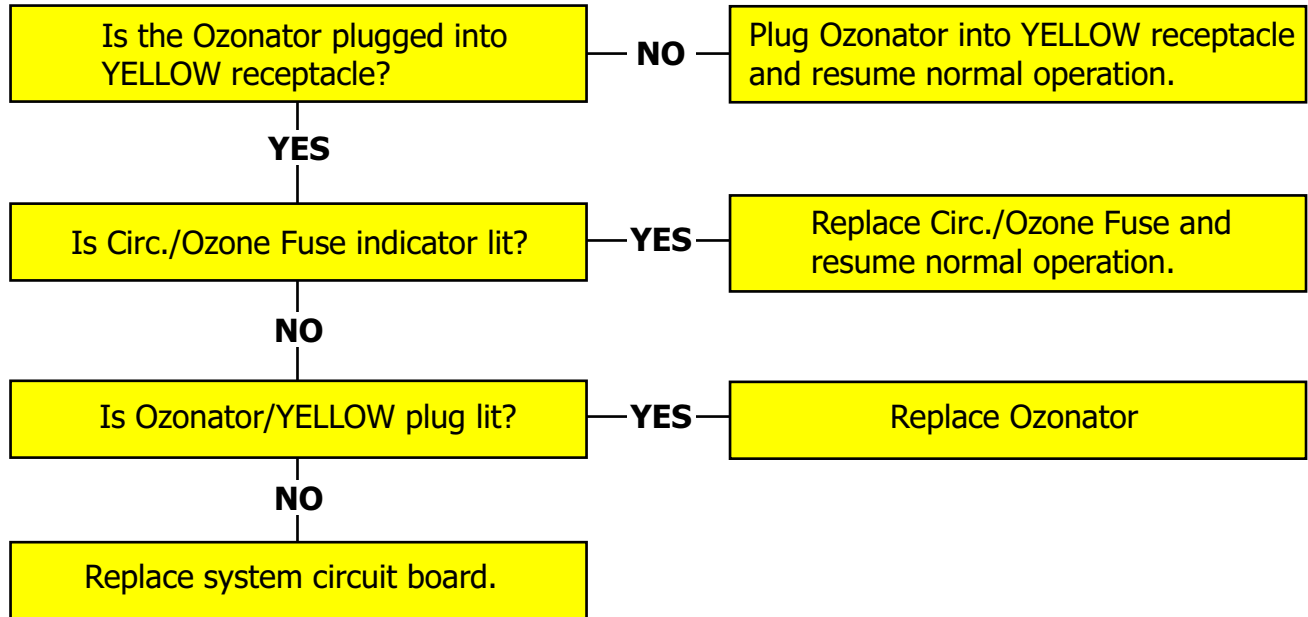
No Air Blower !

Press Blower key, verify the Blower indicator is illuminated on spaside control.



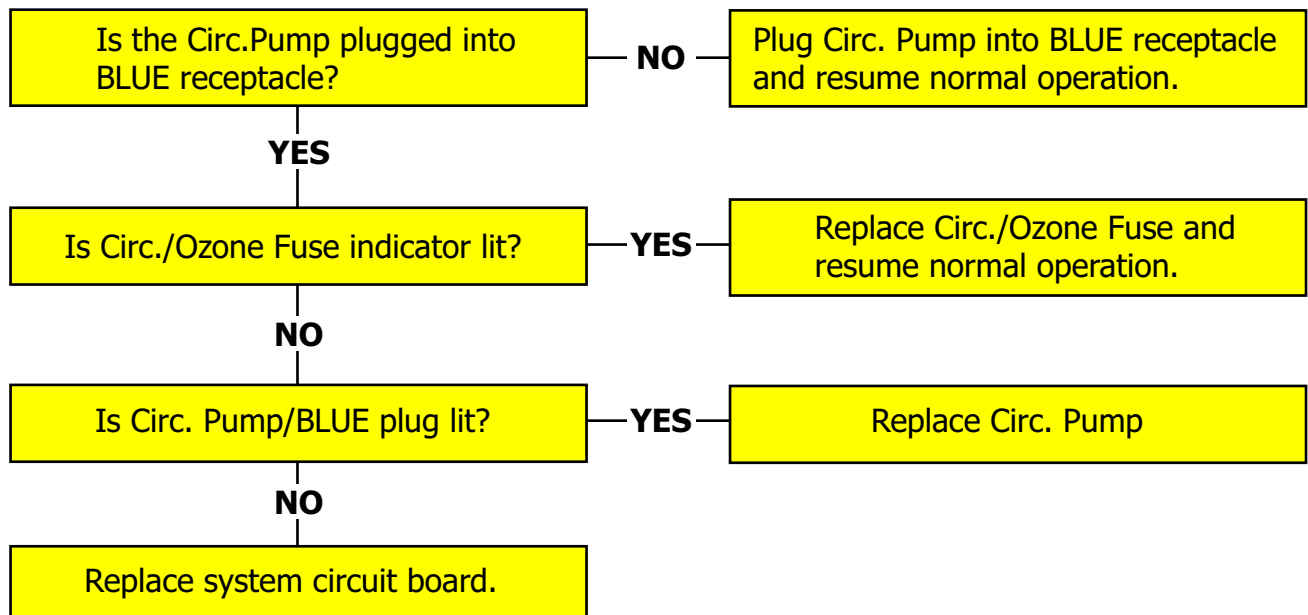
No Ozone!

IMPORTANT - A filter cycle **MUST** be active before the Ozonator will operate. Refer to "Standard Programming" to activate a filter cycle prior to troubleshooting the Ozone circuit.



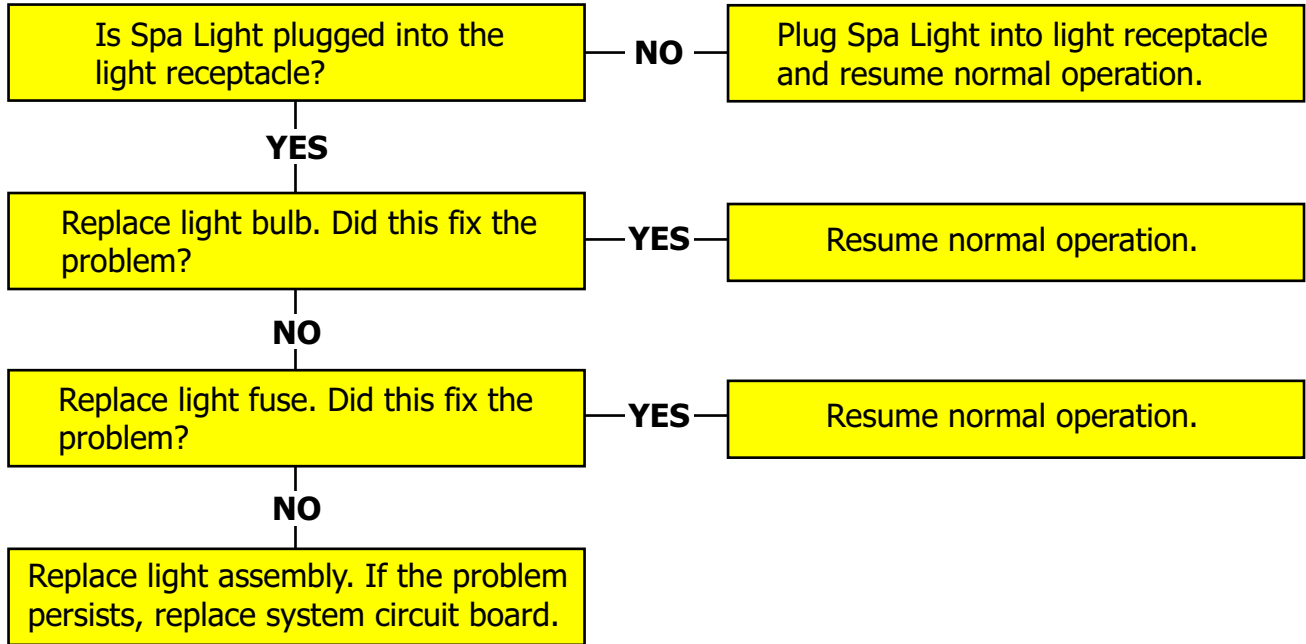
No Circulation Pump!

IMPORTANT - Check "Low Level Program" to verify operation, pump may be in "Over Temp" shut down (4°F over set temperature).



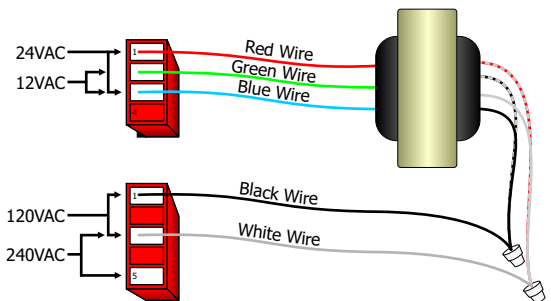
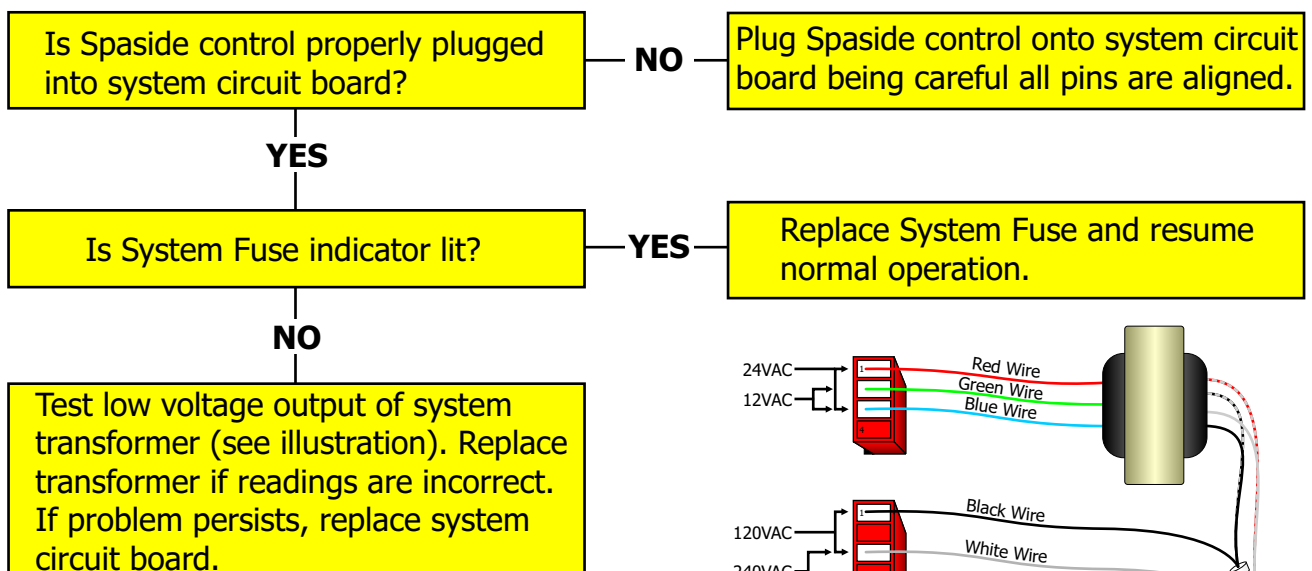
No Spa Light!

The spa Light circuit is protected by its own fuse, with no diagnostic light. Check "Low Level Programming" to verify operation (12V or 120V, single or multiple intensities).



No Spaside Operation !

IMPORTANT - Check "Low Level Program" to verify setting (8 or 10 key control).



Wiring will vary from 120V to 240V. If Black wire is inserted in location 5, the voltage supplied to the transformer is 240VAC.



For more information, contact our knowledgeable Technical Support team.
Open: 8:00am to 5:00pm Mon-Fri



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