



BL-40 UNIVERSAL CIRCUIT BOARD REPLACEMENT KIT

IMPORTANT INSTALLATION INSTRUCTIONS - PLEASE READ!

The BL-40 Universal Circuit Board Replacement Kit replaces Catalina Controls Corporation models RC34, RC4, RC4a, RC4Pa, RMQ4, RC7, RC7a, RC7E and Brett Aqualine models BL-40 and BL-40TC circuit boards. This booklet contains installation instructions and wiring diagrams to assist you in installing the BL-40 circuit board. Please review these instructions in advance to confirm that you have all necessary tools and components, which may not be included in this kit. For any questions not covered, you may contact the Allied Innovations, LLC Technical Service Department between 8:00 a.m. and 5:00 p.m. PST at (702) 361-0600 or e-mail technical@lengordon.com. Terminals 1 and 2 are for line voltage which can be 120V or 240V. The BL-40 Board will automatically detect the voltage and adjust accordingly.

STEP ONE - CONFIGURE THE CIRCUIT BOARD (DIP SWITCH SETTINGS):

The BL-40 incorporates 8 mode selection (DIP) switches to configure the circuit board. The switches are located on the circuit board (SW1) and are preset at the factory to the "OFF" (down) position. Each switch is assigned a number from 1 through 8. To activate the desired mode, use a ball point pen and push the switch to the "ON" (up) position. Factory DIP SWITCH setting: 2 & 6 ON; 1, 3, 4, 5, 7, 8 OFF.

"DIP" SWITCH SETTINGS

Select <u>one</u> of the following setup configurations listed below:	1	2	3	4	5	6	7	8
Single-speed pump(s) installed				M U S T		OFF	N O T	
Two-speed pump installed						ON		
Enable optional second light and aux pump								
Select <u>any</u> of the following options listed below:				B E O F F				U S E D
For continuous circulation pump operation	ON							
Disable 30 minute extended filtration feature		ON						
Enable thermostatic control of pump and heater			ON					
Disable heat if jets/blower is on (120V units)					ON			

- NOTE:**
1. If using a 2-speed pump, Dip Switch #6 must be "ON" for Filtering and Jets.
 2. Switches "4" and "7" are not used and MUST be set to "OFF" position for proper operation.
 3. If using a stand-alone heater, Dip Switch #5 (a separate gas or electric power source) should be "OFF".

STEP TWO - INSTALL THE CIRCUIT BOARD:

WARNING: To prevent electric shock, make sure all power is off prior to attempting installation. Remove the old circuit board (making note of where the wires are connected) and install the BL-40 universal replacement board. Models with integral time clock may require the use of the four 1/4" standoff extensions provided for clearance between the top of the circuit board and the bottom of the time clock.

STEP THREE - LOW VOLTAGE CONNECTIONS:

Using the "LOW VOLTAGE CONNECTION" table on the following page, reconnect all low voltage connections to the BL-40 universal circuit board receptacles. **IMPORTANT NOTE - DO NOT** install freeze SENSORS or JUMPER plugs from model RC4, RMQ4, or RC7 circuit boards to the BL-40 universal circuit board.

LOW VOLTAGE CONNECTIONS

From: RC4, RC34 and RMQ4	From: RC7	From: RC4a, RC4Pa and RC7a	Connect to BL-40 Universal Circuit Board	COMMENTS
P1	P1	'SPA PNL'	'RMT SPA PANEL' P1	Some older circuit boards use 8-pin spa-side connections. The BL-40 uses a 9-pin spa-side connector. To use an existing 8-pin spa-side, shave off the plug 'nub' closest to the green wire. The other 'nub' will act to align the connector correctly.
P2	N/A	P2	'RMT MSTR PANEL' P2	Some older circuit boards use 8-pin in-house connections. The BL-40 uses a 9-pin Master panel connector. To use an existing 8-pin Master panel, shave off the plug 'nub' closest to the green wire. The other 'nub' will act to align the connector correctly.
N/A	P2	P13	'DC TIME IN' P8 OR 'AC CLK IN' P10	Optional - Filtration time receptacle. Use terminal "P8" for low voltage clock connection, or "P10" for high voltage (120 VAC or 240 VAC) clock connection. A pigtail cable kit (Item# 060380) is available for high voltage connection to terminal "P10".
N/A	P3	'HEAT'	'HEATER' P11	120/240 volt conversion jumper receptacle (not on all models).
N/A	P4	P12	'OPTIONS' P9	Optional - Heating timer receptacle. Note: "P9" requires the use of a 9-pin connector. Using the 9-pin connector and crimp-on splices provided in the kit, remove the 3-pin plug, and splice wires to 9-pin connector (polarity is not important).
P4	P5	'TEMP'	'WATER' P3	Temperature Sensor Receptacle. A temperature sensor (Item# 070840 or 38-0400A) <u>must</u> be connected to "P3" for heater operation. IMPORTANT: Older temperature sensors <u>may</u> have reversed plug wiring and will not function with the BL-40. The correct temperature sensor plug wiring is: pin one = cable shield (not used on all models); pin two and three = sensor (reference point - pin one will be located adjacent to nine pin receptacles P1 and P2). If temperature sensor plug wiring is not correct, replace sensor or use a small flat blade screwdriver to pry wires one and three out of plug and reverse. Use screwdriver to full reinsert wires into plug.
P5	P6	'FLOW'	'FLOW SW' P4	Pressure/Flow Switch Receptacle. A pressure switch or flow switch, flow switch, or bypass jumper must be installed for heater operation. IMPORTANT: If a pressure or flow switch is not connected to this receptacle, a jumper plug (Item# 080040) must be connected for heater operation.
P3	P7	---	'FREEZE 1&2' P6 AND P5	Optional Freeze SWITCH Receptacle. IMPORTANT: DO NOT move jumpers or freeze SENSOR used on RC4, RMQ4, or RC7 circuit boards to the BL-40. Only use optional freeze SWITCH (Item# 070120) if freeze protection is desired.

STEP FOUR - HIGH VOLTAGE CONNECTIONS:

Using the WIRING DIAGRAMS on the following pages, reconnect all high voltage-wiring connections to the BL-40 universal circuit board replacement terminal block. "Quick Disconnect" terminals are provided to replace model RC7a circuit boards. Reapply power and check for proper operation.

NOTE: There are many possible wiring configurations. The attached diagrams show "typical" installations. Jumper wires (not provided) may be required for terminal to terminal connections. Use minimum #14 AWG jumper wires for this purpose. For common connections, such as multiple neutral connections, use wire nuts (not provided) or other suitable connector approved for size and number of conductors being spliced together. All connections are to be made in accordance with the National Electrical Code and local codes in effect at the time of installation.

TROUBLESHOOTING (Most common problems):

Heater Does Not Operate, no HEAT indicator light on spa side panel:

Make sure a pressure or flow switch or bypass jumper is connected to terminal P4. If a pressure or flow switch is connected, ensure that the switch is operating correctly.

Make sure system is operating in a heat mode and the spa side control thermostat is set to HOT. If the system is equipped with an optional in-house master control, ensure that this thermostat is also set to HOT.

Make sure temperature sensor is connected to terminal P3. Older temperature sensors may have reversed plug wiring and will not function with the BL-40. The correct temperature sensor plug wiring is pin one = cable shield (not

used on all models); pin two and three = sensor (reference point - pin one will be located adjacent to nine pin receptacles P1 and P2). If temperature sensor plug wiring is not correct, replace sensor or use a small flat blade screwdriver to pry wires one and three out of plug and reverse. Use screwdriver to full reinsert wires into plug.

Heater does not operate, HEAT indicator light on spa side panel is illuminated:

Make sure the heater is operational.

Check wiring at high voltage terminals P11 and P12. The correct wiring will be power in (line) terminal 11 and power out to heater (load) terminal 12.

Pump not operating correctly:

Make sure the DIP switch settings are correct for the type of pump used (single or two speed motor). Make sure the high voltage wiring is connected properly (jumper wires must be installed between terminals 2, 3 and 6).

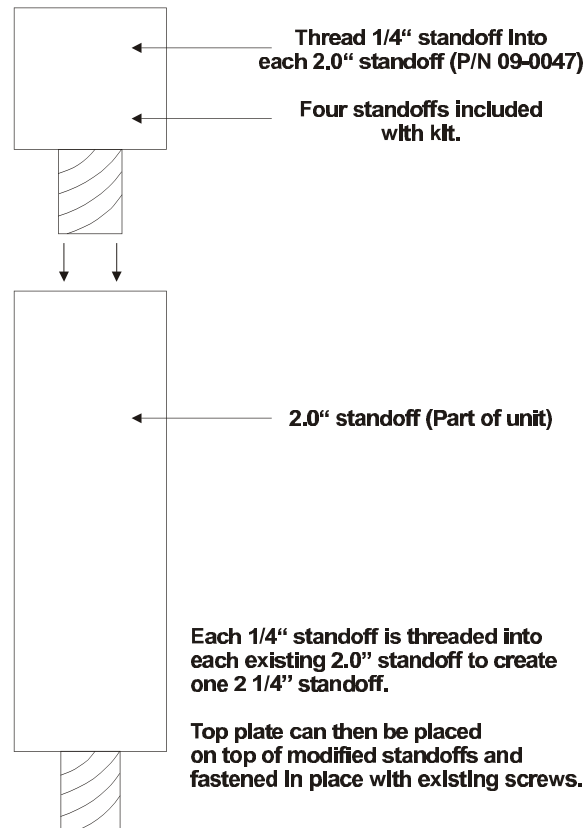
Pump runs continuously:

Make sure filtration timer is OFF.

Make sure the temperature sensor is connected to terminal P3. See Low Voltage Connections table for correct temperature sensor wiring.

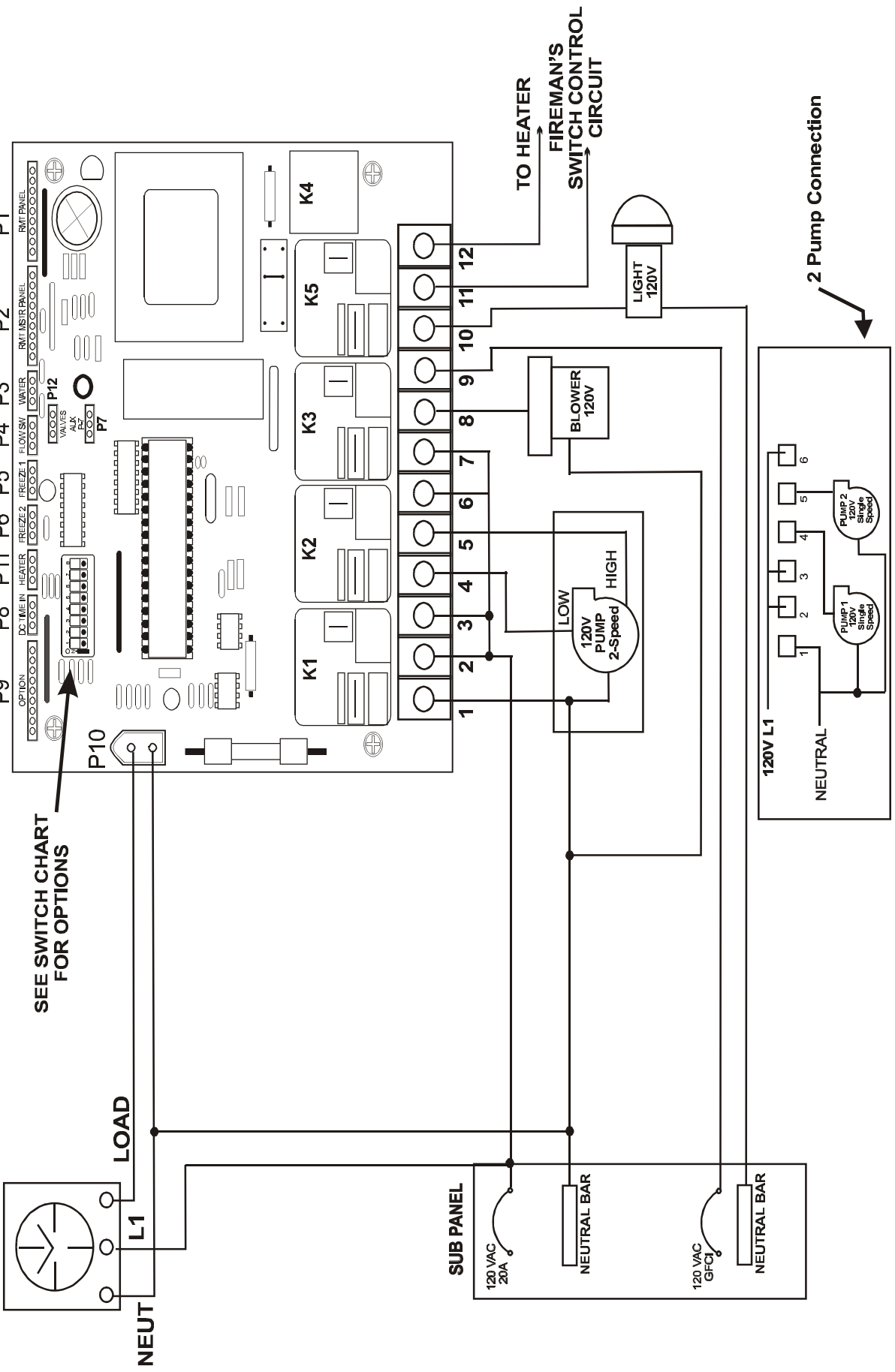
Remove any devices connected to 'FREEZE 1 & 2', terminals P5 and P6. If the pump stops operating, the problem may have been caused by a jumper or freeze sensor installed in these positions. Discard jumper or replace freeze sensor installed in these positions with freeze switch (Item# 070120).

**INSTRUCTIONS FOR MODIFYING
BL-40 UNITS TO ACCEPT NEW PC BOARD 34-5023**

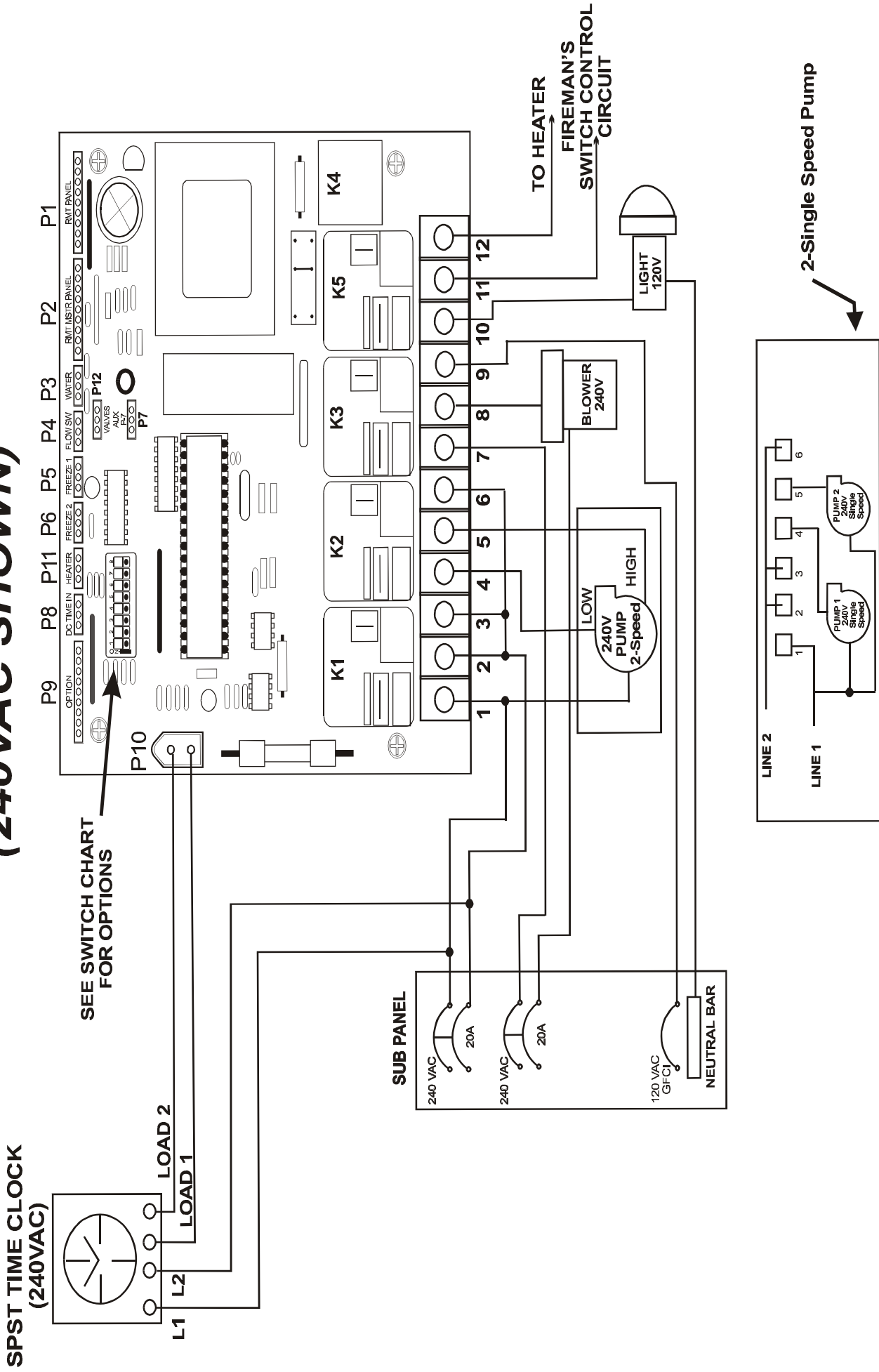


TYPICAL WIRING DIAGRAM USING A SINGLE POWER SOURCE (120VAC SHOWN)

SPST TIME CLOCK (120VAC)



TYPICAL WIRING DIAGRAM USING A SUBPANEL (240VAC SHOWN)



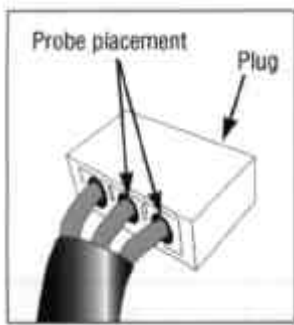
TEMPERATURE vs RESISTANCE TABLE

TEMP (degrees F)	THERM KOHM	TEMP (degrees F)	THERM KOHM	TEMP (degrees F)	THERM KOHM
32	32.7	56	16.9	80	9.25
33	31.8	57	16.5	81	9.03
34	30.9	58	16.0	82	8.82
35	30.0	59	15.6	83	8.61
36	29.2	60	15.2	84	8.41
37	29.4	61	14.8	85	8.22
38	27.6	62	14.5	86	8.03
39	26.8	63	14.1	87	7.84
40	26.1	64	13.7	88	7.66
41	25.4	65	13.4	89	7.48
42	24.7	66	13.1	90	7.31
43	24.0	67	12.7	91	7.14
44	23.3	68	12.4	92	6.98
45	22.7	69	12.1	93	6.82
46	22.1	70	11.8	94	6.67
47	21.5	71	11.5	95	6.52
48	20.9	72	11.2	96	6.37
49	20.4	73	11.0	97	6.23
50	19.8	74	10.7	98	6.09
51	19.3	75	10.4	99	5.96
52	18.8	76	10.2	100	5.83
53	18.3	77	9.95	101	5.70
54	17.8	78	9.71	102	5.57
55	17.3	79	9.48	103	5.45
				104	5.33
				105	5.22

TEMPERATURE SENSOR AND HIGH LIMIT SENSOR CHECKOUT PROCEDURE

The temperature sensor and high limit sensor utilize a thermistor which changes resistance as a function of temperature. In order to troubleshoot the thermistor, you must know what the resistance should be at a given temperature

Use a standard VOM (Volt/Ohm Meter) set to read R x 10,000:



Disconnect the sensor from J2 (temperature sensor) or J3 (high limit sensor) on the Control circuit board. Attach a 3 pin base to the sensor plug to provide male contact points for resistance reading, or insert probe tips into the back of plug until contact is made.

the temperature sensor (by attaching the VOM probes to the leads that correspond with the wire connections on the temperature sensor).

- Use an accurate thermometer and check the spa water temperature. The acceptable range is 2EF below the actual spa water temperature. See the example below.
- Refer to the Temperature vs Resistance Table above and compare the spa water temperature to determine if the resistance readings are within the acceptable range.

Example: Temperature vs Resistance range

	92	6.98	_____
-2EF!	93	6.82	
	94	6.67	•
Water Temp!	95	6.52	Acceptable
	96	6.37	Resistance
	97	6.23	Range
+2EF!	98	6.09	—

Using the VOM, record the resistance reading of

WARRANTY

Allied Innovations, LLC warrants its products to be free from defects in workmanship and material under normal use and conditions for a period of one year from the date of original manufacture. Should repair be required by reason of any defect or malfunction during the warranty period, Allied Innovations, LLC will repair, or at their discretion, replace this product without charge, subject to verification of the defect or malfunction, upon delivery of the product to the attention of:

Technical Service Department
Allied Innovations, LLC
7215 Bermuda Rd
Las Vegas, NV 89119-4304

If repair is required after the expiration date of the warranty period, Allied Innovations, LLC will repair this product and bill for any necessary replacement parts, shipping and handling.

This warranty is void if: 1) the unit is not installed per the instructions; 2) is hooked up to improper voltage; 3) is subjected to chemical corrosion; 4) is mechanically or electrically altered in any way; 5) is subjected to water or immersion; 6) contacts show evidence of short circuiting, or the unit has been visibly damaged by accident or misuse or which has been damaged by wind, rain, lightning, freezing or other cause; or upon which the serial number or manufacture date has been altered, effaced or removed. There is a charge for replacement parts if the defective unit is returned for any of the reasons listed above.

Allied Innovations, LLC shall not be liable for any inconvenience, loss of time, or incidental expenses incurred. Allied Innovations, LLC shall not be liable for any labor charges associated with the removal or re-installation of any so-claimed defective products.

This is the only warranty expressed or implied by Allied Innovations, LLC. Warranties implied under state law, including any implied warranty of merchantability or fitness for a particular purpose, shall be limited to one year from the date of manufacture.

Allied Innovations, LLC disclaims any liability for any incidental or consequential damages.

Ship as follows:

1. Pack the unit in a well padded, heavy corrugated box.
2. Include name, return address, and daytime phone number along with a short description of problem with control.
3. Mail the unit, prepaid, to the above address.

Some states do not allow the exclusion or limitation of incidental or consequential damages, therefore the above limitation may not apply to you.



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ATTENTION INSTALLER

This unit was shipped from the factory with a mini jumper (Item #400190, shown at right) installed in the "Flow Switch" (P4) receptacle. Make sure that this jumper is secure prior to installing the unit. If a connection to an external pressure or flow switch is desired, use optional Pressure/Flow Switch Cable (Item #070110) in place of this jumper. **The heater circuit will not operate without this jumper or an external pressure or flow switch connected to (P4) receptacle.**

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