

HYDROQUIPTM

THE SMART CHOICETM

Outdoor Series INSTALLATION & OPERATIONS MANUAL



To ensure that the system is installed properly, provide your electrician with these instructions.

8700 Series

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GETTING STARTED

For the best installation possible, review all the provided instruction materials, and share with your electrician/installer for advanced planning. A complete understanding of what's needed before starting work will make things go smoothly, and at the lowest possible cost.

This manual includes complete instructions for electrical and plumbing connections, the addition of pumps, gas heaters, lights, system startup, troubleshooting, and your warranty guidelines.

First identify the Equipment System (ES) or Control System (CS) from your product label. Refer to this code when using the GFCI breaker sizing matrix, and wiring diagrams in this manual

ES series controls include a factory mounting base, and main system pump. The separate quick –start sheet #85-0115-4 has detailed instructions for pack assembly, and pump cord installation guide is inside this manual

CS series controls are designed for a wall mount application. Your electrician must follow all local codes and restriction pertaining to placement of an accessible electrical service.

* Copies of this manual are available online at www.hydroquip.com

Your Hydro-Quip 8000 series control has a factory pre set program. Details for changing system behavior and/or adding new components will be found in this manual.

Warning! Make no attempt to modify, disconnect, damage or adjust the safety devices contained in this equipment system. Alteration of safety devices can cause serious component damage, and/or result in unsafe operation leading to personal injury or death

Save a copy of this manual

TERMS / GLOSSARY

AC Connection	Alternating Current connection point (typically high voltage)
Additional Panel Button	Refers to HQ PT# 34-0224. Required for 3rd pump operation
Amperage Requirement	The accumulated total amperage of all items to be placed on a single breaker
AUX PCB	Smaller daughter board connected to main PCB
Auxiliary Pump	A pump that has been added to the original equipment system (ie Aux pump #2)
Blower	Appliance providing compressed air for the purpose of massage therapy
Bonding Wire	Continuous bare copper wire connecting all metallic object and electrical components to the equipment & ground rod
BWA™APP	Downloadable Balboa Water Application for wireless system control
Copper Conductors	Electrical wires made from copper alloy materials
Dedicated Circuit	An electrical supply to a remote location, having breaker protection and no additional branch or service connections
Default Programming	The standard position or programming in which the system is tested and leaves the factory
Dip Switch	Movable programming switch located within a switch-bank (on PCB)
Dip Switch Banks	Set of switches used to change operational logic and system behavior (on PCB)
Discharge	Pump exit side (piping placed on pressure side of pump)
Dual Source Wiring Dual source power supply	Electrical power supplied by two individual wiring sources (two breakers)
Gas Heater Control Circuit	Wiring provided inside gas heaters, that can be connected to 8000 systems for operational control. Commonly called a fireman circuit
GFCI Breaker	Ground Fault Circuit Interrupter. Specialty breaker with a detection and reaction device to interrupt power when current leaking is detected to ground
GFCI breaker #1	Main 8000 system breaker, required 4 wires with incorporated "Neutral"
GFCI breaker #2	Optional breaker for independent heater operation. Required 3-wire connection, without "Neutral"
Heater Input Leads	Provided wires for connection of heaters in the dual source configuration
Jumper Pins	Circuit board electrical posts for logic changes.

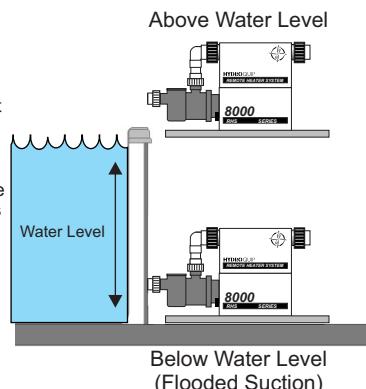
TERMS / GLOSSARY

Jumper Wire	Movable wires used for changing voltage or operation
KW	Kilowatt. Heater resistance rating used for identifying energy consumption.
Line of Sight	A clear and unobstructed path, in which an object or item can be spotted from or near the spas edge.
Light Jumper	Movable coupling located on the jumper pins for changing operational behavior
Logic Jumper	
Liquid Tight Conduit	Tubing that resists water and debris penetration, made specifically for wiring
Main Control	In reference to the 8000 series control box, with factory provided components
Main Pump or Pump #1	System provided pump used for heating and filtration
NEC	National Electrical Code. Regulations for design and materials on electrical installation.
Ozone/Ozonator	Appliance designed for spa water sanitation
PCB	Printed Circuit Board (refers to main board)
Persistent Memory	Programming that remains unchanged, until the power is turned off and back on
Priming	Initial pump operation until the air is evacuated from the pump and supply lines
Pump Amperage	The highest amperage measured, when the pump is under full load
Max Pump Amperage	condition
Pump Pot/Basket	Reservoir mounted to the pump with removable lid and strainer basket
Single Source Wiring	Electrical power supplied by a single wiring source and breaker
Single source power supply	(one breaker)
Sub Panel	An electrical service box mounted remotely from the main house power panel
Suction	Pump front inlet side (piping between spa suction and pump pot)
System Data Label	Label placed on control box providing serial identification, and vital data
System Disconnect	An easy and safe means of 100% electrical disconnection, without obstruction or the need for tools. See NEC and UL qualifications for approved devices.
Terminal Strip	Electrical connection point for components within the PCB Box
Total System Amps	Highest amperage measured when all components are operating simultaneously
Wi-Fi Enabled	Having the capacity to control using a wireless connection

SYSTEM INSTALLATION REQUIREMENTS

The Hydro-Quip 8000 Series Solid-State Systems were designed for indoor or outdoor installations. This equipment may be used for both inground and above ground spas/hot tubs.

- The Equipment System must be installed on a firm, level surface (ie: concrete or plastic base)
- The area where the system is installed must have adequate drainage to prevent flooding of the equipment under all circumstances.
- For performance reasons locate the system as close to the spa/hot tub as practical. (Consult local codes for minimum distance between equipment and spa)
- Provide adequate access around and above the System for service and maintenance. Three (3') of clearance around the equipment is recommended.
- The pump(s) provided with the system may or may not be self-priming. Pumps that are NOT self priming must be installed BELOW water level or they will not prime.
- The Spaside control has a 50' cord length. Plan routing distance between the equipment and vessel to be less than 44ft.



PLUMBING INSTALLATION INSTRUCTIONS

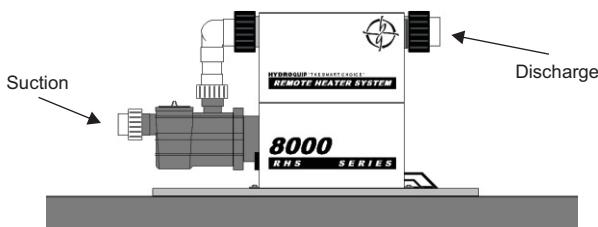
To assure adequate performance, the use of 2" piping is recommended.

There may be 3 or 4 separate plumbing systems in the spa. Verify the function of each pipe.

- 1) Suction System Plumbing - this plumbing will connect to the spa's skimmer, main drain and suction fittings. This plumbing connects to the front end of each pump.
- 2) Discharge System Plumbing - this plumbing will go to the spa's hydrotherapy jet and massage fittings. This plumbing connects to the open end of the heater on your Equipment System.
- 3) Air Blower Plumbing - this plumbing will go to an air channel under the floor, or to an air distribution manifold of the spa. This plumbing connects only to an air blower.
- 4) Aux Pump Plumbing - When more pumps are added, this piping will not interconnect with the heater control system. Follow the spa/hot tub manufactures instruction for connection, and safety suction requirement

To allow for safe operation of the spa/hot tub, the suction fittings must be agency approved and rated Max Flow capacity.

After plumbing is complete, secure the Hydro-Quip Equipment System with the appropriate hardware.



Refer to plumbing schematic Fig.1 on page 15

INSTALLATION CONSIDERATIONS

The Hydro-Quip 8000 series incorporates the most advanced controls in the industry, and are designed for years of trouble free operation. However, for year round success, review these design recommendations for extreme weather areas.

*For best results, review this manual completely before starting your project.

Hot weather conditions

Water temperatures can be elevated from high outside “ambient” temperatures. If this occurs, remove the insulating cover and add cool water until the heat has dissipated to a safe level

Hot temperatures and/or direct sunlight to the equipment system can cause temporary operational problems.

Pumps are equipped with special overload devices to self protect when encountering extreme heat conditions. All motors are equipped with an automatic reset device, and will resume operation when they become cool. Pumps can be enclosed, but require adequate ventilation

Direct sunlight on equipment can bring temperatures beyond the allowable point for circuits to function correctly. The system will shut off into a protection mode (see troubleshooting guide.) To prevent this condition, plan an equipment cover that incorporates shade, access and ventilation

Freezing weather conditions

If you wish to utilize/operate your system during seasons that may experience freezing temperatures, please incorporate pipe insulation, draining capabilities and incorporate an equipment cover that protects from snow and freezing rain. In all cases standing water, and snow should not be allowed to accumulate in or around the equipment.

If you wish to winterize your spa/hot tub, please contact your spa/hot tub manufacturer or local area pool/spa/hot tub professional for details.

In all cases make a plan for system draining in case of a power loss. Where possible, design plumbing drains and disconnects to evacuate water before it becomes frozen and does system damage.

Note the 8000 systems incorporate a freeze sensing technology, that will automatically operate the pumps when temperatures drop below 43F. Moving the water will not allow pipes and equipment to form ice.

ELECTRICAL INSTALLATION

NOTICE! Before attempting installation of this equipment system, read all the information contained in this manual, and confirm the installing electrician understands and follows all national and local codes and safety instructions.

All connections must be made by a qualified and licensed electrician in accordance with the National Electrical Code (NEC article 680 Canadian Electric Code, and with any local codes in effect at the time of installation.

All connections must be made according to the electrical installation label on the outside of the system box (see page 33) Follow all instructions provided in this manual, and at labeled connections. If your electrician is unclear on how to correctly connect this equipment, call your system supplier. Note that damage caused by mistakes can be costly, and invalidate your warranty.

A GFCI (Ground fault circuit interrupter) breaker is a mandatory electrical device required for installation on all pool/spa applications as specified in the National Electrical Code Article 680-42.

The GFCI must be properly sized, and be connected with the appropriate sized wire per NEC Code Table 310-16. All ground wires must be connected per NEC Table 250-122 Follow the instructions provided in this manual (see pages 7-9) for proper location and connection of this safety device

This equipment requires a dedicated electrical supply circuit, with no other appliances or lights connected.

IMPORTANT – The NEC and most local codes require that an electrical “disconnect” be installed within “line of site” of the spa

Use copper conductors only, with grounding wire properly sized per the National Electric Code table 250-95.

A bonding lug has been provided on the control box, allowing connection to local ground points. To reduce the risk of electrical shock, use only a properly sized copper bonding wire from this lug to all metal ladders, water pipes and other metallic objects within 5 feet of the spa/hot tubs edge.

ELECTRICAL INSTALLATION

This equipment system has been 100% factory tested for quality and reliability prior to shipping. Care should be taken on all electrical connections to avoid damage to the system circuit board, and added components. Damaged caused by accidents, improper wiring configurations and/or abuse voids your warranty.

Start by having your electrician select a wiring configuration that best fits your total system needs, from the GFCI breaker sizing matrix on page 8.

Due to the availability of GFCI breaker sizes, and your electrical supply requirement, some systems require a second independent or “dual” power source, to supply the electric heater separately. Diagrams for independent heater wiring is provided in this manual.

Note: 5.5kw systems using a single source power supply will not allow electric heater operation, when pumps are in high speed. See system programming to change operation if available.

<u>System Type</u>	<u>Heater size</u>	<u>Connection type</u>
Gas heat	none	Single source power supply
Electrical heat	5.5kw	Single source power supply
Electrical heat	5.5kw	Dual source power supply
Electrical heat	11.0kw	Dual source power supply
Gas/Electric Combo	5.5 or 11kw/Gas	Single Source power supply

All Hydro-Quip 8000 series control systems require a 4 wire electrical supply, incorporating a “Neutral” wire for operation. Electric heaters being powered independently in the “dual” circuit configuration **does not** require a neutral wire supply. This is clearly explained in the wiring diagrams.

For gas heaters electrical connection, consult your gas heaters supplier manual, and note in this manual contains important wiring instructions for control and operation of the gas heaters fireman circuit.

Gas and electric heater combination

When faster heat recovery is desired, or a redundant heat source is a priority, it's possible to install both a gas and electric heater on the same 8000 series system.

Default programming allows both the gas heater control circuit (page 15) and electric heater circuit to operate simultaneously. Input from both heat sources will speed up heating times, and also provide an operating alternate if one source becomes disabled. You must follow all installations instructions for both the gas heater, and electric heater plumbing and wiring requirements to successfully connect. No PCB programming change is required.

GFCI BREAKER SIZING MATRIX

240V Single source wiring (One breaker required)

System order code on label	System heater type	Pump 1 & System 17A Max	Aux. pump-2 12A max	Aux. pump-3 12A max	Total system Amps	GFCI Breaker	Page
ES8748G, H, J							
ES8750G, H, J	Gas	x	-	-	17	20 amp #1	13
CS8700C							
ES8748G, H, J							
ES8750G, H, J	Gas	x	x	-	30	30 amp #1	13
CS8700C							
ES8748G, H, J							
ES8750G, H, J	Gas	x	x	x	43	50 amp #1	13
CS8700C							
ES8748D, E							
ES8750D, E	5.5kw	x	-	-	41	50 amp #1	12
CS8700B							
ES8748D, E							
ES8750D, E	5.5kw	x	x	-	54	60 amp #1	12
CS8700B							

240V Dual source wiring with separate heater electrical supply (Two breakers required)

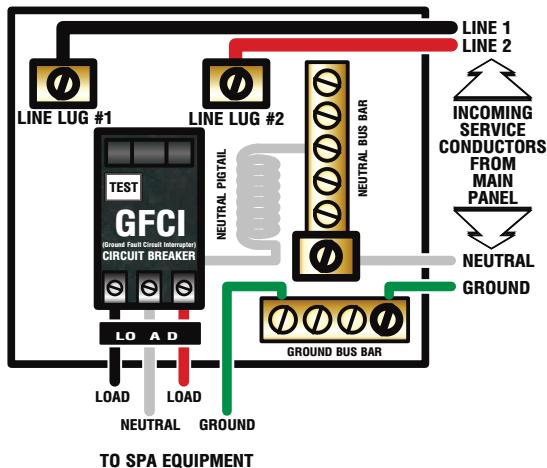
System order code on label	System heater type	Pump 1 & System 17A Max	Aux. pump-2 12A max	Aux. pump-3 12A max	Total system Amps	GFCI Breaker	Page
ES8748D, E		x	x	x	43amp system	50 amp #1	
ES8750D, E, F	5.5kw	-	-	-	24amp heater	30 amp #2	11
CS8700B							
ES8748A, B, C		x	-	-	17amp system	20 amp #1	
ES8750A, B, C	11kw	-	-	-	46amp heater	60 amp #2	10
CS8700A							
ES8748A, B, C		x	x	-	30amp system	40 amp #1	
ES8750A, B, C	11kw	-	-	-	46amp heater	60 amp #2	10
CS8700A							
ES8748A, B, C		x	x	x	43amp system	50 amp #1	
ES8750A, B, C	11kw	-	-	-	46amp heater	60 amp #2	10
CS8700A							

GFCI WIRING DETAIL

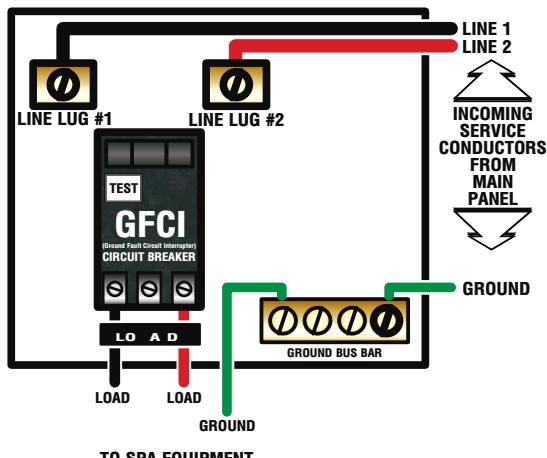
Improperly wired GFCI breakers are the leading cause of immediate GFCI tripping. It is important that your system be wired properly, reference the illustrations below for guidelines.

WARNING: Refer to the circuit breaker manufacturer's installation instructions. This illustration is meant to be a guideline, and not meant to override or substitute the instructions supplied by the breaker manufacturer

GFCI BREAKER #1 (240v 4-wire with neutral)



GFCI BREAKER #2 (240v 3-Wire) For Independent Heater



11KW ELECTRICAL CONNECTIONS

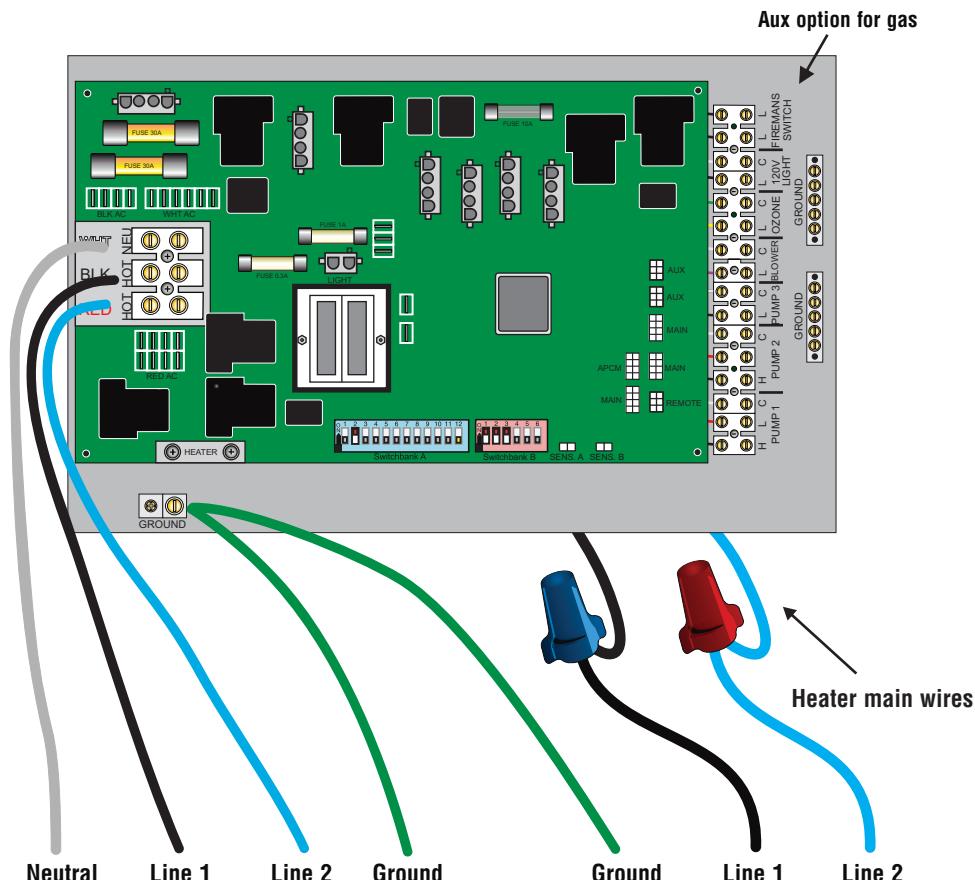
11KW electric heat “Main” control with independent heater wiring (Dual source wire connection)

For correct GFCI breaker sizing, see electrical requirements matrix on page 8

Factory programming allows heater and high speed pumps to operate simultaneously

FOR SYSTEM MODEL CODES (Label located on outside of box)

ES8748A ES8748B ES8748C CS8700A
ES8750A ES8750B ES8750C



GFCI BREAKER #1

(240v 4-Wire only)

see page 8 for breaker sizing

GFCI BREAKER #2

(240v 60Amp 3-Wire only)

see page 8 for breaker sizing

5.5KW ELECTRICAL CONNECTIONS

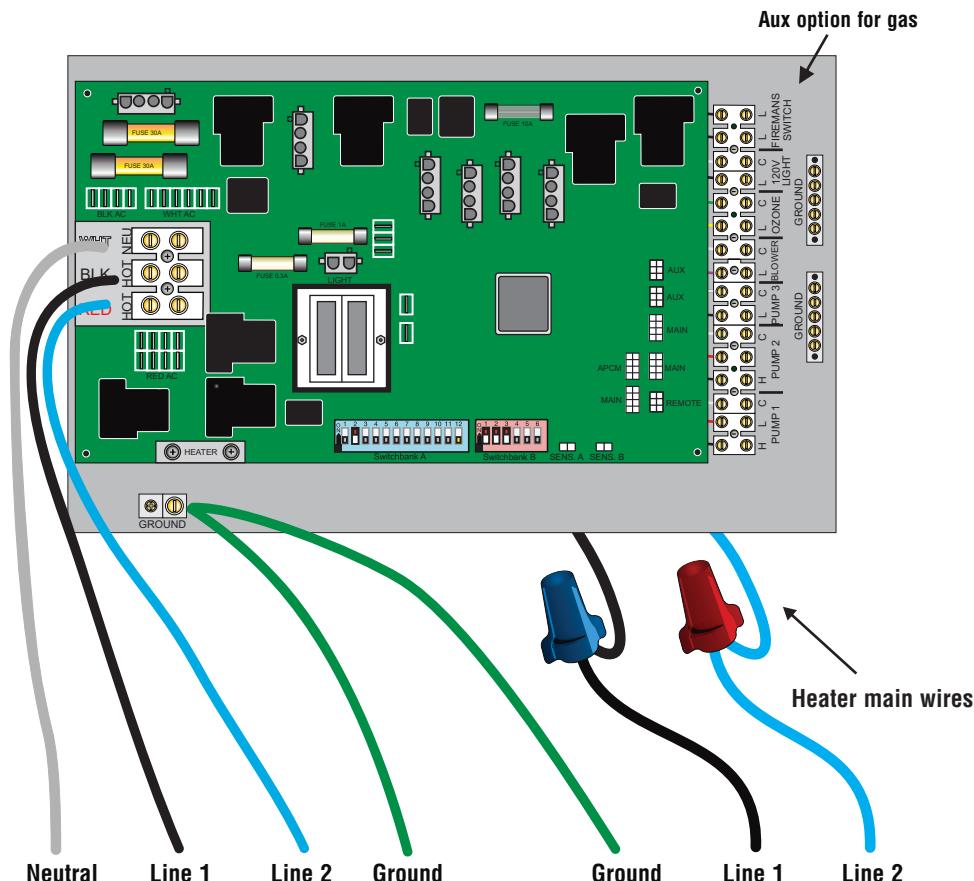
5.5KW electric heat “Main” control with independent heater wiring (Dual source wire connection)

For correct wire and GFCI breaker sizing, see electrical requirements matrix on page 8

Factory programming allows heater and high speed pumps to operate simultaneously

FOR SYSTEM MODEL CODES (Label located on outside of box)

ES8748D ES8748E ES8750F
ES8750D ES8750E CS8700B



GFCI BREAKER #1

(240v 4-Wire only)

see page 8 for breaker sizing

GFCI BREAKER #2

(240v 3-Wire only)

see page 8 for breaker sizing

5.5KW ELECTRICAL CONNECTIONS

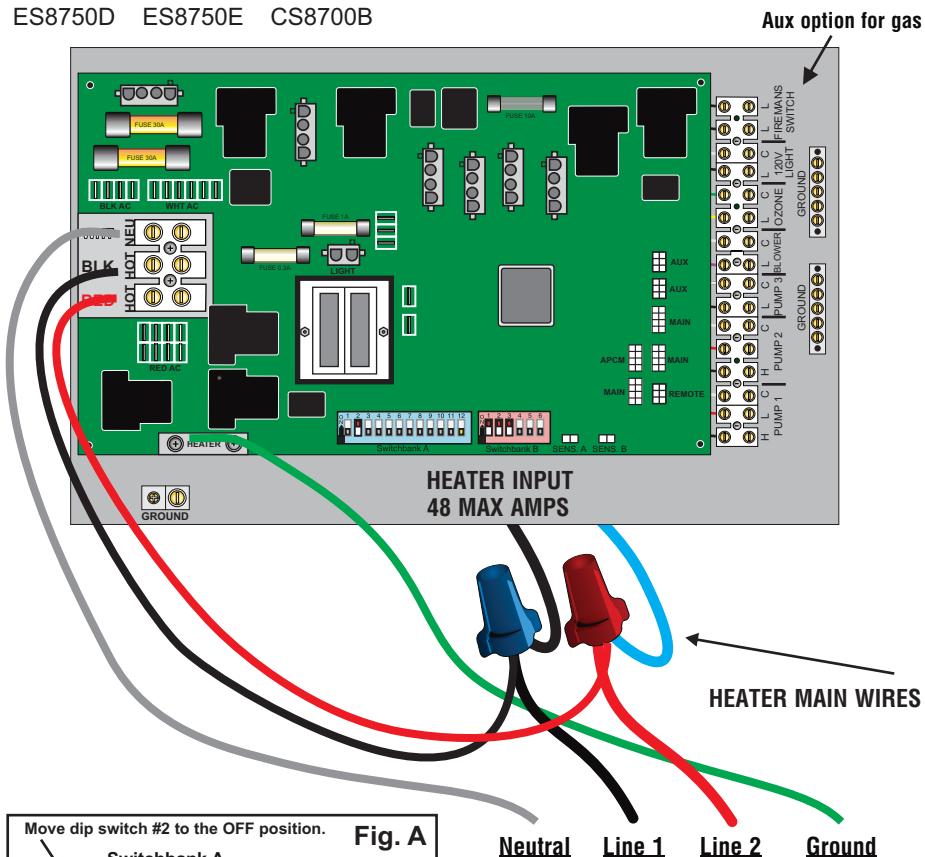
5.5KW electric heat “Main” control system wiring diagram (Single source wire connection)

For correct wire and GFCI breaker sizing, see electrical requirements matrix on page 8

Programming allowing heater and high speed pump operation simultaneously requires “dip switch” change on board (see figure below)

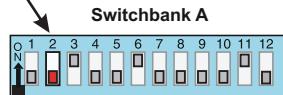
FOR SYSTEM MODEL CODES (Label located on outside of box)

ES8748D ES8748E ES8750F
ES8750D ES8750E CS8700B



Move dip switch #2 to the OFF position.

Fig. A



A2 - ON=High Current, No Heater Restriction
OFF=Low Current, Heat on Low Speed Only

GFCI BREAKER #1
(240v 4-Wire only)
see page 8 for breaker sizing

GAS ELECTRICAL CONNECTIONS

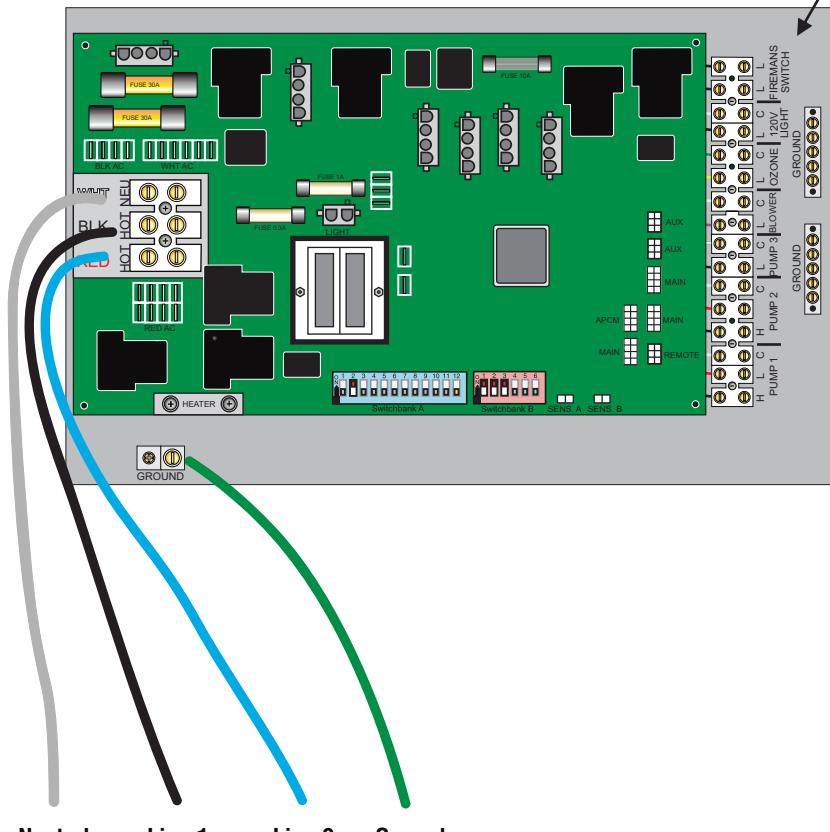
(Single source wire connection)

For correct wire and GFCI breaker sizing, see electrical requirements matrix on page 8

FOR SYSTEM MODEL CODES (Label located on outside of box)

ES8748G ES8748H ES8748J CS8700C
ES8750G ES8750H ES8750J

Gas heater
internal control
see page 15



GFCI BREAKER #1

(240v 4-Wire only)

see page 8 for breaker sizing

NEW COMPONENT CONNECTION

Connecting additional pumps, blowers, gas heaters and light

Addition of any new component to the system, requires wiring installation accordance to the NEC guidelines for outdoor appliances, and using only materials suitable for outdoor applications

Wiring locations for all components are called out below, and are clearly marked inside the system control box.

* When a pump or blower is added to a control, it's required you check the power output for correct supply voltage, and change the "dip switch" programming to recognize the newly added item. Configuration guides for adding items are found in the following pages

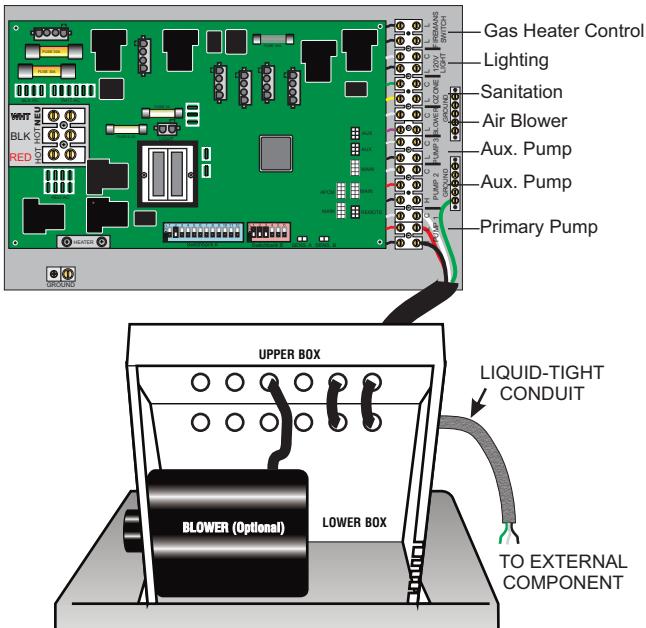
Pumps pages 16, 20, 21

Blowers pages 17, 20, 21

Gas heater pages 13, 15

Light page 18

The system is set up to have components hardwired to a terminal strip inside the enclosure. Liquid tight conduit must be used on all externally added field connections exposed to the weather. Route and connect the conduit to the knock-outs in the back of the lower box. The wires will then enter the bottom of the box through another set of knock-outs. Connect the component(s) accordingly to the corresponding position on the terminal strip and tighten securely. Refer to the included wiring diagram as needed. All components not included with the system are set at the factory for 120V. Verify the voltage of the additional component(s) and adjust supply voltage if necessary by referring to System Configuration on pages 17.

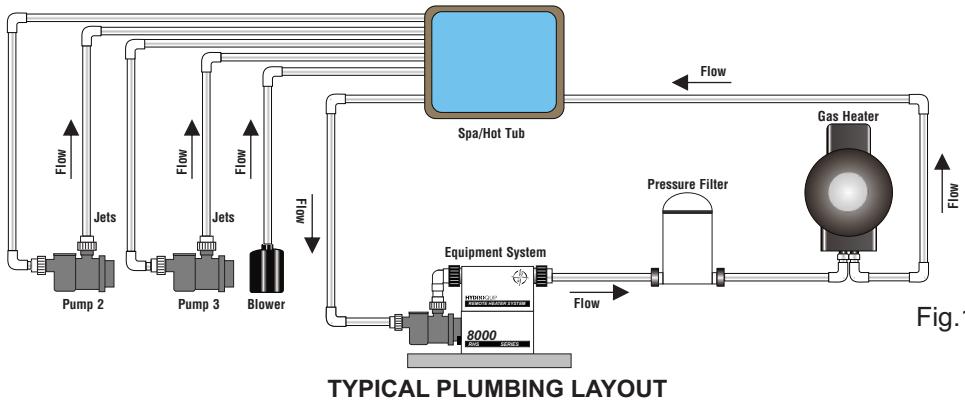


GAS HEATER CONNECTION

Warning: Do not install a spa that utilizes a natural gas or propane heater without proper venting. These heaters require adequate ventilation and must be installed according to the heater manufacturers instructions and to local building codes.

Warning: Gas heaters MUST be installed in the plumbing AFTER the control system as shown below. Fig.1

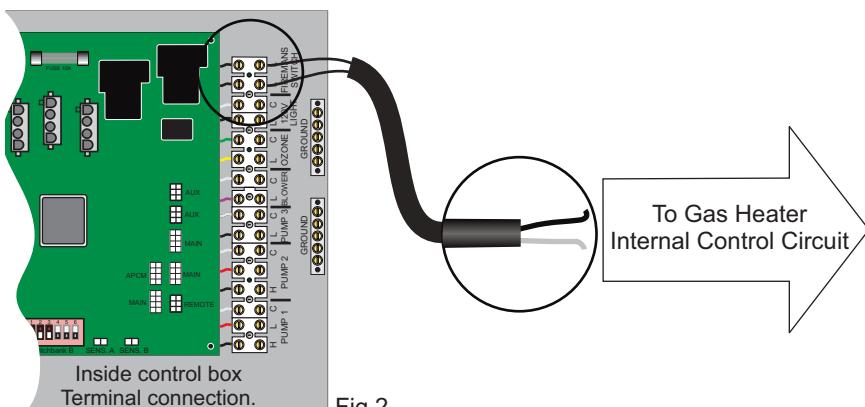
Note: Many gas heaters require a separate electrical service for proper operation, the Hydro-Quip "Gas Heater Control Circuit" does NOT provide voltage to any gas heater circuits. Always refer to the manual included with your gas heater for proper installation.



TYPICAL PLUMBING LAYOUT

Gas Heater Control Circuit

Your control system contains a Gas Heater Control Circuit Fig.2. This circuit is a passive or "dry contact" circuit, do not apply line voltage to this circuit. Connect this circuit to the gas heater's Fireman Switch or Fireman Circuit. Refer to the instructions provided with your gas heater to identify the circuit / switch and correct wiring connection. Additional programming may be required to the gas heater to utilize an auxiliary control system.

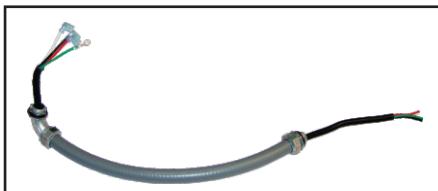


IMPORTANT: Applying line voltage to Gas Heater Control Circuit voids all warranty.

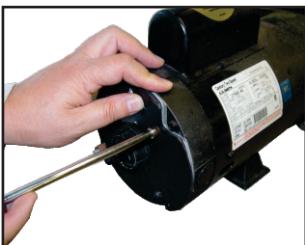
PUMP CORD INSTALLATION

The equipment system has been provided with a pump power cord and liquid-tight conduit assembly. This is to be used on the main 2-speed pump supplied with the system. Any other components or accessories attached to the equipment system should be attached in a similar manner.

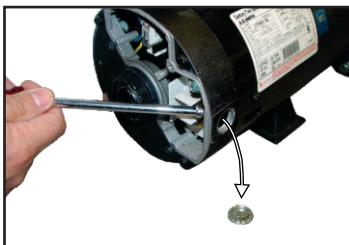
Follow the simple instructions below to quickly attach the cord assy to the pump:



Cord Assy included for Pump 1



1) Remove the terminal cover off the back off the pump



2) Remove the conduit hole cover



3) Route the power wires through the conduit hole and pull toward you to allow for the cord assy to be rotated for tightening.



WIRING NOTE:
RED = LOW
BLACK = HIGH
WHITE = COMMON
GREEN = GROUND

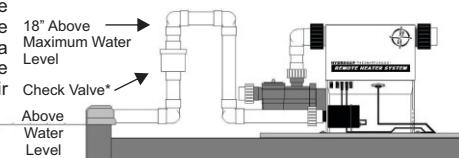
4) While holding the wires as shown thread the liquid-tight connector into the pump until secure then connect the power wires to the pump per the label on the pump.



5) Route the other end of the conduit through and empty knock-out and secure with lock-nut. The cord inside will route up to the terminal strip inside the upper portion of the enclosure.

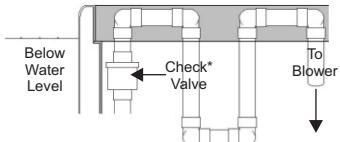
AIR BLOWER INSTALLATION (Optional)

CAUTION: The air blower must be connected ONLY to the spa's air distribution plumbing. Connecting the air blower to the air piping associated with the hydrotherapy jets will create a hazard by providing a path for high-pressure water to be forced into the blower motor. This will result in damage to the air blower, and create an electrical shock hazard.



- The air blower must be installed to ensure that water cannot enter the air blower motor. This can be accomplished by installing a single or double air loop that incorporates a check valve.

*



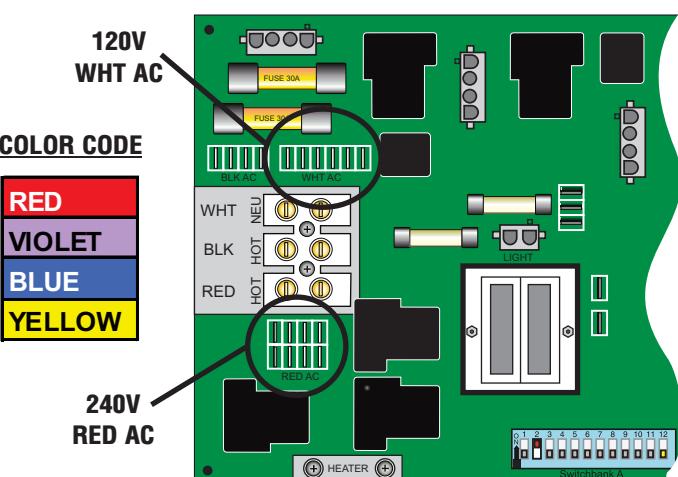
SYSTEM CONFIGURATION

The control circuits for components not included with the system have been pre-configured for 120V at the factory. This is to prevent accidental damage to equipment. A 240V component connected momentarily to a 120V power supply will not be damaged. A 120V component connected to a 240V power supply can be damaged immediately. For this reason Hydro-Quip cannot be held responsible for damage caused due to mis-wire.

Below are illustrations and instructions for converting the universal circuits of your control. Hydro-Quip utilizes color coded connectors to help identify each circuit. Simply locate the colored connector on the Neutral (white) wire from each component receptacle on the PCB. Using the wiring diagram provided with each control (located inside of cover), remove the Neutral connector from its WHT AC / Neutral position and reconnect to an empty position at the RED AC / Line 2 connection block. Once accomplished the conversion is complete, repeat these steps for each component that operates on 240V.

- (1) Remove connector from WHT AC connection
- (2) Reinstall connector onto RED AC connection

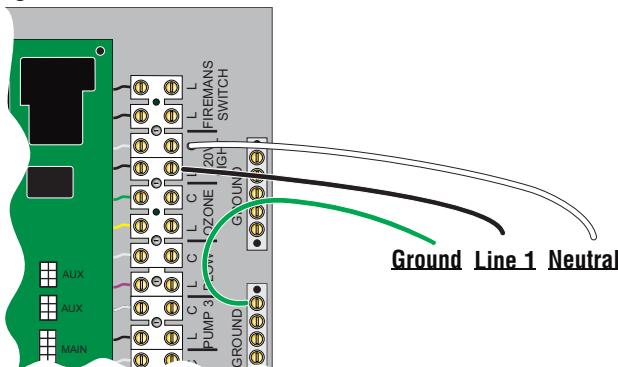
COMPONENT	COLOR CODE
PUMP 1	RED
PUMP 2	VIOLET
BLOWER	BLUE
OZONE	YELLOW



SPA LIGHT WIRING

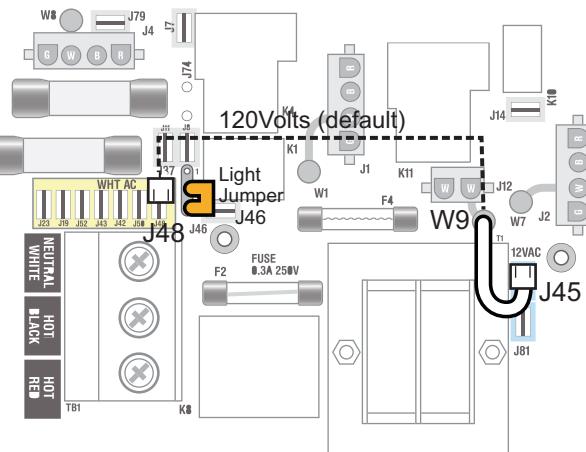
The Hydro-Quip 8000 system comes with a standard 120V spa light connection. This electrical supply can also be configured for a 12V power supply by following the steps for 12V conversion below.

Note that some custom systems are factory set to 12V. Check power supply before connecting light wires.



12V conversion steps required for converting the light circuit to 12V.

- 1) Power off spa utilizing the circuit breaker.
- 2) Remove Light Jumper J46 from pins 1&2 and place the Light Jumper J46 on pins 2&3.
- 3) Jumper wire W9 is connected to J48 by default. Remove the jumper wire from J48 and place on J45.
- 4) Power on spa.



Light Jumper J46

120Volts (default)
Jumper covering pins 1&2

12Volts
Jumper covering pins 2&3

Jumper Wire W9

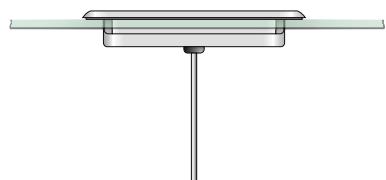
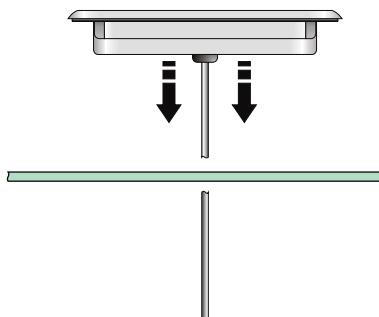
120Volts (default)
J48

12VAC
J45 12Volts

SPASIDE CONTROL INSTALLATION

If required, cut out a 6 3/8" x 2 3/8" hole in the spa shell using the Spaside Cutout Template that has been provided with the system.

- The mounting area must be above the maximum water level of the spa and in an area with good drainage to prevent any standing water on or around the spaside.
- The spaside should never be submerged.
- The spaside should be protected from extended periods of exposure to sunlight.
- Do not place the spaside where it can be kicked or stood on.



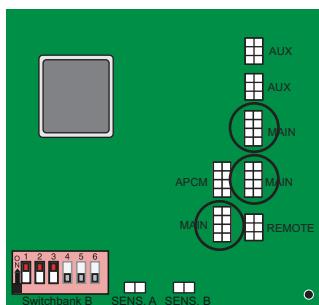
Step 1 - Clean area and insert spaside control.

Step 2 - Remove the double sided adhesive from the back of the spaside. Make certain the spaside is straight and adhere to the spa shell.



OVERLAY MAY VARY

Step 3 - Remove protective film from display window then clean the face of the spaside.



Step 4 - Connect spaside to an empty connection marked "Main" on PCB

Step 5 - After making sure the surface is clean, carefully align and apply the overlay. Press around all surfaces firmly.

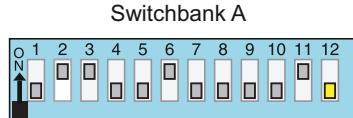
8700 SERIES - COMPONENT CONFIGURATION OPTIONS

DEFAULT CONFIGURATION:

- Pump 1 - 2 Speed
- Pump 2 - 1 Speed
- Blower

Internal Configuration Required:

No addition configuration required

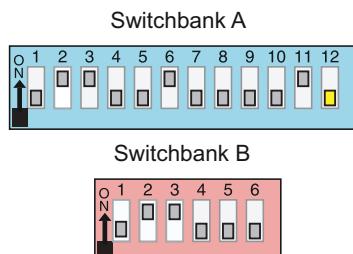


OPTION 1:

- Pump 1 - 2 Speed
- Pump 2 - 2 Speed
- Blower

Internal Configuration Required: See PCB wiring schematic provided with pack

- Modify Dip-Switches as shown**
- Remove Pump 3 plug from auxiliary PCB
- Move BLOWER (J3) to auxiliary PCB.
- Connect LOW SPEED PUMP 2 wire (free hanging 4 pin AMP plug w/RED Wire) to Blower Connection (J3)

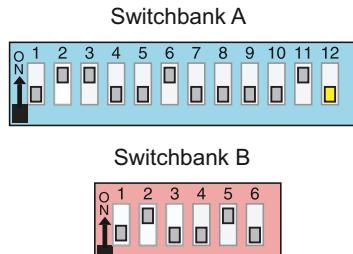


OPTION 2:

- Pump 1 - 2 Speed
- Pump 2 - 2 Speed
- Pump 3 - 1 Speed

Internal Configuration Required: See PCB wiring schematic provided with pack

- Modify Dip-Switches as shown**
- Disconnect BLOWER (J3)
- Connect LOW SPEED PUMP 2 wire (free hanging 4 pin AMP plug w/RED Wire) to Blower Connection (J3)
- NOTE: Pump 3 requires additional button (HQ PT# 34-0224)

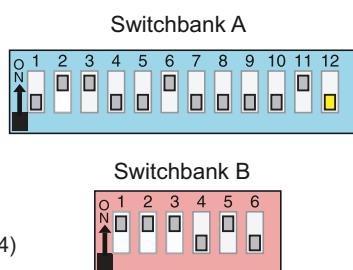


OPTION 3:

- Pump 1 - 2 Speed
- Pump 2 - 1 Speed
- Pump 3 - 1 Speed
- Blower

Internal Configuration Required:

- Modify Dip-Switches as shown**
- NOTE: Pump 3 requires additional button (HQ PT# 34-0224)



**Persistent Memory must be reset after making changes to the dip switches. To reset Persistent Memory power the system down, turn Switch A12 "ON", power up system and wait for "PR" to be displayed on the keypad. Then set switch A12 to "OFF" (this can be done with the power to the system "ON" as long a non-conductive tool is used).

8700 SERIES - PROGRAMMING

It is possible to change various operational characteristics of the control system using the Dip Switch Blocks located on the lower edge of the main control PCB (Printed Circuit Board) inside the control box. Persistent Memory must be reset when changing the dip switches. To reset Persistent Memory power the system down, turn Switch A12 "ON", power up system and wait for "PR" to be displayed on the keypad. Then set switch A12 to "OFF" (this can be done with the power to the system "ON" as long a non-conductive tool is used).

Switchbank A



DIP SWITCHBANK A:

- A1 - Test Mode (normally Off)
ON=High Current/no Heater Restrictions
OFF=Low Current/heat With Low Speed Only
- A3 - ON=Filtration Program By Duration
OFF=Filtration Program By Time (special Keypad Required)
- A4 - ON=24 Hour Clock/Military Time
OFF=12 Hour Clock/Standard AM/PM Time
- A5 - ON=Celsius Temp Readout
OFF=Fahrenheit Temp readout
- A6 - ON=30 Minute Timeouts
OFF=15 Minute Timeouts
- A7 - ON=Cleanup Cycle ON (30min after spa use Pump1 & Ozone for 1 hour)
OFF=Cleanup Cycle OFF
- A8 - ON=Ozone Suppression for 1 hour when Pump or Blower Press
OFF=Ozone Suppression OFF
- A9 - OFF/NOT USED
- A10 - OFF/NOT USED
- A11 - ON=Ozone with Filtration Cycles
OFF=Ozone with Low Speed Pump
- A12 - ON=Persistant Memory Unlocked
OFF=Persistent Memory Locked (Normal Position)

Switchbank B



DIP SWITCHBANK B:

- B1 - ON=Single Speed Pump 2
OFF=Tw0 Speed Pump 2
- B2 - ON=Pump 2 Enabled
OFF=Pump 2 Disabled
- B3 - ON=Blower Enabled
OFF=Blower Disabled
- B4 - ON=Fiber Wheel Enabled (additional kit required)
OFF=Standard Light Output
- B5 - ON=Pump 3 Enabled
OFF=Pump 3 Disabled
- B6 - ON=ML900 Panel Support/Scrunching Enabled
OFF=Normal Panel Layout

NOTE: Not all settings are available and are Keypad or Auxiliary PCB Dependent

STARTING UP THE SYSTEM

System Startup Procedure:

- 1) It's required that you read and familiarize yourself with the provided systems operation manual, before attempting to start the system.
- 2) Inspect that the electrical equipment cover is secure on the pack, and there are no exposed wires, or incomplete work to be performed.
- 3) Make sure all hose bibs, drain valves, air controls ect are closed. Inspect equipment components, making sure the pump drains plugs, pump and heater unions are tight.
- 4) For spas equipped with a pressure filter, make sure the housing band, drain plug and air relief valves are closed and tight.
- 5) Using a garden hose, fill the spa with fresh water to the recommended level by the spa manufacturer.
- 6) If the pumps are equipped with strainer pots, remove the lid and continue to fill each pump pot completely. Make sure the basket is free of debris, and the o-ring is clean and lubricated before replacing lid.
- 7) Open all service shut-off valves to allow 100% water flow between the spa and equipment. Once again inspect all glued plumbing connections, unions and equipment for water leaks.
- 8) Power system on, and immediately test the Ground Fault Circuit Interrupter (GFCI) breakers for proper operation, according to the manufacturer's instruction, Typically this is done by pressing the "test" button.

WARNING: If the breaker fails to trip to the off position when the button is pushed (not operating to manufactures test protocol) STOP ALL TESTING!, and place the breaker in the off position manually. DO NOT ATTEMPT SYSTEM OPERATION and consult your electrician before proceeding.

- 9) Once GFCI testing is confirmed, proceed to prime the main pump by pressing the "Jet" button for high speed operation. Allow pump to run until the plumbing lines have cleared the trapped air, and a steady water flow is achieved.
- 10) Follow this same priming and air purge procedure for optional pumps #2 and #3 if connected.
- 11) Once all pumps are purged and operating. Once again check for leaks.
- 12) Test system blower and light by pressing the identified spaside buttons.

*Refer to the troubleshooting guide in this manual if these components fail to operate

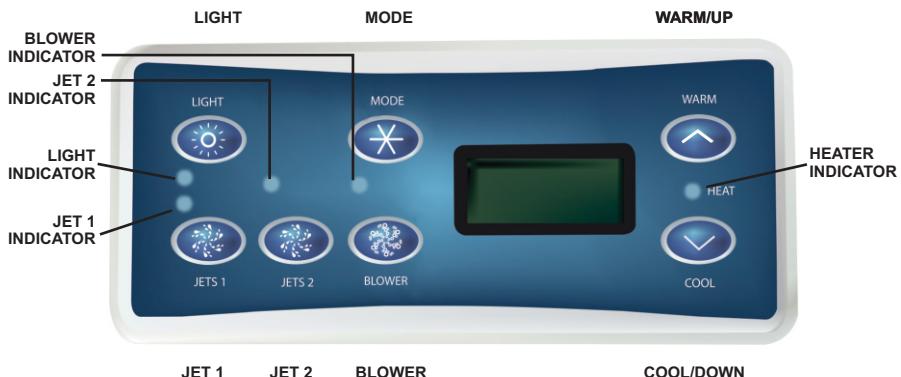
STARTING UP THE SYSTEM

System Startup Procedure:

Initial Start-Up: When the system is first started (or any time the power is reset) it will go through a series of diagnostic checks, displaying various information on the display, and finally ending with the control panel reading “PR” or Priming Mode. If no buttons are pressed the system will start up after 4 minutes. Priming mode can be bypassed by pressing the “Warm” or “Cool” button and setting a temperature which will cause the pump to start and system to begin initiating a heat call.

The system does not use a Flow or Pressure switch and therefore must perform various checks within the heater to assure there is proper water flow. All heat calls will begin with a short 3 second power of the heater to make sure there is water present and to determine the direction of the water flow. After this initial check the system will do an extended water temp & flow test that is displayed on the keypad by a rapidly flashing heater light. This will take place for 2 minutes after which time the heater will come on if everything is proper with the installation of the system. The heater light on the keypad will be solid when the heater is “ON”.

SPASIDE CONTROL



Default System Operation: When power is applied, or there is a loss of power the system will initiate its default programming. The filter cycle will start 6 minutes after power has been applied and repeat 12 hours later if programmed to do so.



Pump 1 Key: Pressing this key when the pump is OFF will turn it ON to Low Speed, a second press switches the pump to High speed, a third press turns the pump OFF. If the pump is already ON from manual activation, an automatic timer will turn the pump off after 30 minutes of operation. A light will appear next to the Pump 1 button when it is active. If the pump cannot be turned off a filter cycle is active.



Aux / Pump 2 Key: Press this key to turn Pump 2 ON and OFF, an automatic timer will turn the pump off after 30 minutes of operation. A light will appear next to the Pump 2 button when it is operating.



Blower Key: Press this key to turn the blower ON and OFF, an automatic timer will turn the blower off after 30 minutes of operation. A light will appear next to the Blower button when it is operating.



Light Key: Press this key to turn the light ON and OFF, an automatic timer will turn the light off after 4 hours of operation

SPASIDE CONTROL



Temperature Set Keys: Press the “Cool/Up” button or “Warm/Up” button to display the current set water temperature. Pressing either button while the set temperature is displayed will increase or decrease the set temperature by 1°F. The temperature is adjustable between (80°F - 104°F / 26°C - 40°C)



Mode Key: This button is used to switch between Standard, Economy, and Sleep modes. Press “Mode” to enter mode programming, press “Cool” to cycle through the available modes (the LCD will flash until confirmed), then press the “Mode” button to confirm and save the setting.

Standard Mode: Maintains the desired water temperature. Note that the displayed water temperature is only accurate when the pump has been running for at least 1 minute. “STD” will be displayed briefly when you switch into Standard Mode.

Economy Mode: Heats the spa only during filter cycles. “ECN” will appear solid when the temperature is not current and flash when the temperature is not current.

Pressing “Jet 1” while in Economy mode puts the system in **Standard-in-Economy Mode**, “SE” which operates the same as Standard Mode then reverts back to Economy Mode after 1 hour. When in this mode pressing “Cool” or “Warm” followed by “Light” will switch the mode back to Economy immediately.

Sleep Mode: Heats the spa to within 20°F (11°C) of the set temperature only during filter cycles. “SLP” will appear on the display until this mode is changed.

Standby Mode: Pressing “Cool” or “Warm” followed by the “Blower” or “Pump 2” key will turn off all spa functions temporarily. This mode is helpful when changing the filter and performing other basic service where having the pump running is not desirable. Pressing any button exits Standby mode. If no user action is taken Standby mode is cancelled after 1 hour and system operation returns to normal.

FILTRATION PROGRAMMING

The filtration programming of the system is “Duration” and “Frequency” based. The “Duration” is the length of time the system filters and the “Frequency” is the number of time per day the cycle runs.

Duration is user programmable [**F1-F12**) or 1 to 12 hours per cycle

Frequency is user programmable from 1 or 2 cycles per day: **D**=Day Cycle Only, **N**=Night Cycle Only, **DN**=Day & Night Cycle

The first filter cycle starts 6 minutes after the system is powered on and the second cycle (if programmed) starts 12 hours later.

Press “Cool” or “Warm” followed by the “Pump 1” to enter filtration programming mode, the current filtration setting is displayed **FX**. Press the “Cool” or “Warm” to adjust the filtration duration (**F1-F12**), press “Pump 1” again to adjust the “Frequency of the cycle (**D**, **N** or **DN**), then press “Jet 1” again to exit the programming mode. If continuous filtration is desired program the system to **F12** and **DN**.

USER PREFERENCES

There are a number of aspects of the spa control operation that may be customized by the user using the User Preference sub-menu.

Press “Cool” or “Warm” followed by the “Pump 1” then “Light” within 3 seconds of the previous key press to enter this mode. If “**USR**” does not show on the display [press the ‘Cool’ button until “**USR**” is displayed then press “Jet 1” to enter the User Preferences sub-menu.

Once in the sub-menu press “Cool” or “Warm” to cycle through the setting available for modification:

SR (Suppress Reminders) - When set to “**SRY**” reminders are never displayed on the panel. When set “**SRN**” reminders are displayed on the panel periodically. Available reminders are based on the spaside and software used.

TC (Temperature Readout) - When set to “**TCY**” the temperature is displayed in Celsius. When set to “**TCE**” the temperature readout is displayed in Fahrenheit.

24 (Time Display) - When set to “**24Y**” time is displayed in 24hr. (Military) format. When set to “**24N**” time is displayed in standard (AM/PM) format.

AD (Dolphin II Remote Address) - When set to “**AD0**” no addressing is used. Use this setting for a Dolphin I remote or a Dolphin II remote that is set to “No Address” (this is the factory default for the Dolphin II remote). When set to “**AD1**” through “**AD7**” the number is the address (see your Dolphin remote manual for details).

TROUBLESHOOTING - SPASIDE ERROR CODES

To assist the user in identifying problems with the spa, the system will display error messages in the lower window. These messages will be helpful when communicating with your local dealer or qualified technician if a problem should arise.

Diagnostic Messages

Message	Meaning	Action Required
<i>OHH</i>	No message on display. Power has been cut off to the spa.	The control panel will be disabled until power returns. Time of day will be preserved for 30 days with a battery back-up on ES8750 and CS8750 systems.
<i>OHS</i>	“Overheat” - The spa has shut down. ¹ On some systems, an alarm may sound. One of the sensors has detected 118°F (approximately 47.8°C) at the heater.	DO NOT ENTER THE WATER. Remove the spa cover and allow water to cool. Once the heater has cooled, reset by pushing any button. If spa does not reset, shut off the power to the spa and call your dealer or service organization.
<i>ICE</i>	“Ice” - Potential freeze condition detected.	No action required. The pumps and the blower will automatically activate regardless of spa status.
<i>SnA</i>	Spa is shut down. ¹ The sensor that is plugged into the Sensor “A” jack is not working.	If the problem persists, contact your dealer or service organization. (May appear temporarily in an overheat situation and disappear when the heater cools.)
<i>SnB</i>	Spa is shut down. ¹ The sensor that is plugged into the Sensor “B” jack is not working.	If the problem persists, contact your dealer or service organization. (May appear temporarily in an overheat situation and disappear when the heater cools.)
<i>SnS</i>	Sensors are out of balance. If this is alternating with the temperature, it may just be a temporary condition. If the display shows only this message (periodically blinking), the spa is shut down. ¹	If the problem persists, contact your dealer or service organization.
<i>HFL</i>	A substantial difference between the temperature sensors was detected. This could indicate a flow problem.	Check water level in spa. Refill if necessary. If the water level is okay, make sure the pumps have been primed. Press any button to reset.
<i>LF</i>	Persistent low flow problems. (Displays on the fifth occurrence of the “ <i>HFL</i> ” message within 24 hours.) Heater is shut down, but other spa functions continue to run normally.	Follow action required for “ <i>HFL</i> ” message. Heating capacity of the spa will not reset automatically; you may press any button to reset.
<i>dr</i>	Inadequate water detected in heater.	Check water level in spa. Refill if necessary. If the water level is okay, make sure the pumps have been primed. Press any button to reset.
<i>drY</i>	Inadequate water detected in heater. (Displays on third occurrence of “ <i>dr</i> ” message.) Spa is shut down. ¹	Follow action required for “ <i>dr</i> ” message. Spa will not automatically reset; you may press any button to reset.
<i>Pr</i>	When your spa is first actuated, it will go into Priming mode.	See the M-7 Installation Instruction Manual for complete instructions on Power-up and Pump Priming. The Priming mode will last for up to 4 minutes and then the spa will begin to heat and maintain the water temperature in the Standard mode.

TROUBLESHOOTING - SPASIDE ERROR CODES

Message	Meaning	Action Required
--F	Temperature unknown.	After the pump has been running for 1 minute, the temperature will be displayed.
--	Temperature not current in Economy or Sleep mode.	In Economy or Sleep mode, the pump may be off for hours outside a filter. If you wish to see the current spa temperature, either switch to Standard mode or turn Jets 1 on for at least 1 minute.
Sby	Standby Mode has been activated by pressing a button combination on the user panel.	Press any button, except "Jets 1", to leave Standby Mode and return to normal operation.
Std	The spa is operating in Standard Mode.	Temperature display is current after pump has been running for at least 2 minutes.
Ecn	The spa is operating in Economy Mode.	" Ecn " will appear solid on the display when the temperature is not current. " Ecn " will alternate with the temperature when the temperature is current.
SE	The spa is operating in Standard-in-Economy Mode.	Operates the same as Standard mode, then reverts to Economy mode after 1 hour. Press "Mode" to switch directly to Economy mode.
SLP	Sleep Mode has been activated by pressing a button combination on the user panel.	" SLP " will appear solid on the display when the temperature is not current. " SLP " will alternate with the temperature when the temperature is current.
drn	The pump is on during Standby Mode to assist in draining the spa.	Press "Jets 1" to turn off the pump when water has drained (or power off the spa.)
rE	Hardware failure.	Contact your dealer or service organization.
PSE	Hardware failure.	Contact your dealer or service organization if message appears on more than one power up.
ErE	Firmware install problem.	Contact your dealer or service organization if message appears on more than one power up.
FFE	Configuration error. Spa cannot start up.	Contact your dealer or service organization.
StU	A pump appears to be stuck on, causing the water temperature to creep up, possibly to hazardous levels.	POWER DOWN SPA IMMEDIATELY. DO NOT ENTER THE WATER. Contact your dealer or service organization.
H0E	A pump appears to have been stuck on the last time spa was powered.	POWER DOWN SPA IMMEDIATELY. DO NOT ENTER THE WATER. Contact your dealer or service organization.

TROUBLESHOOTING

The following describes operational problems, and the possible solution. Note that your system may not include all the components listed in this guide

Warning: Allow only a qualified electrician, service technician or your system installer to test the electrical components and wiring

NOTHING OPERATES

Set GFCI breakers and quick disconnect to “on” position. If power will not reset, contact your electrician or installer. If power restores, but there are no lights on topside, or the system fuse has blown, contact your installer

GFCI TRIPS IMMEDIATELY OR RANDOMLY

Make sure the equipment is not wet internally. Moisture inside equipment, or malfunctioning parts will cause GFCI Trip. Reset breaker when conditions are dry, and inspect for water leaks in or around equipment.

Loose wires can cause over amperage, and malfunctioning equipment can also be the cause of intermittent GFCI tripping. Contact your electrician or installer if tripping persists

*If a particular component trips the GFCI when operated. This will assist your installer with faster repairs

PUMP DOESN'T START

Confirm spaside command for pump

Confirm motor is not overheated, and wait for it to cool down.

Recheck pump cord installation was done correctly per instructions

Have electrician or installer check supply fuse and system voltage

MOTOR RUNS/NO FLOW

Confirm gate valves are 100% open & spa is full of water

Confirm pump basket and spa filter are free of debris

Confirm adjustable spa jets are in the open position

Confirm pump is not frozen with ice, or has clogged pipes

Prime pump with water on high speed (see start-up inst)

Have installer confirm pumps have correct voltage supply per instructions

PUMP HAS LOW FLOW

Check for dirty filter or basket, low spa water level, valves partially closed, or all jets in the off position. Jet system should be plumbed using spa manufactures instruction for pipe sizing.

TROUBLESHOOTING

PUMP STOPS DURING TIMED CYCLE

Motor overheat protection has tripped, allow motor to cool before reactivating
If motor continues to overheat, have an electrician check voltage and connections.

PUMP SURGES OR LOSES PRIME

Check for low water level, loose lid on pump, pipe leaks on suction plumbing, debris in filter or suction fittings

PUMP MAKES CAVITATION OR "GRAVEL" SOUNDS

Check filter and baskets for debris overload

Check gate valves for full open position

Pump not having baskets or filters removed could clog pump impeller. contact your installer.

PUMP DOESN'T STOP AFTER FILTER OR JET CYCLE

Pump will continue to run in low speed, if the water is not at the set temperature.
See "standard mode" in operations manual.

If filter cycle programs are overlapped, see operations manual

When freezing weather protection is activated. See "ICE" in operations manual

Main system pump #1 will operate once an hour for a few minutes to sample the spa/hot tubs vessel temperature.

BLOWER DOESN'T START

Confirm operational command on spaside. Have installer review wire connection and test fuse.

BLOWER TRIPS GFCI

Blower internals could be wet. Make sure device was placed above water level and/or incorporates a loop per the installation instructions, so water cannot reach motor. If motor is confirmed dry and continues to trip GFCI, contact your installer.

BLOWER RUNS, NO AIR

Make sure all blower plumbing is connected, and there is no ice formed in the lines.

The blower will not clear long distance pipes holding too much water. Confirm a plumbing loop was installed near the spa per the assembly instructions

Confirm correct voltage has been supplied to blower, if added to system. If problem continues call your installer

TROUBLESHOOTING

LIGHT NOT WORKING

Confirm operational command on spaside. Light installed should be 120v. unless installer used 12v light, and reprogrammed board wiring and logic using this manual

Make sure the bulb is in the correct position in the light assy. Contact your installer or electrician to confirm wire connection, bulb operation, and light fuse

OZONE NOT WORKING

The ozone circuit will only work when the main pump #1 is in low speed operation. Confirm with ozone suppliers operations manual for appliance testing. Ozone circuit supply voltage is factory set at 115V (unless altered), test for correct supply voltage for ozonator.

NO HEAT

Main pump must be on and pumping water for heater to operate. Low water levels, dirty filters, or loss of prime will cause the pump to surge, and heater will not function

Confirm the heat light is on the spaside. And there is no error code message on spaside. Spas heat slowly, so allow the system to run several hours before testing for temperature rise.

On some system the heater is not allowed to operate when 2 or more pumps are operating. Reference setup in this manual for programming changes, when power supply allows.

NO HEAT (GAS HEATER)

Gas heaters have their own operating system, independent from the 8000 series control. You must have the gas heaters thermostat set to "max" and the fireman electronic control wired to the 8000 system for proper control.

Refer to the gas heater hookup instruction in this guide for proper fireman switch connection, and consult the heater suppliers manual for all other operation and troubleshooting

WATER NOT REACHING SET TEMPERATURE

Note that pump must be primed completely and running for heater to operate. Additionally the system will not allow programmed temps above 104F.

Confirm heat indicator is on spaside display

Spaside should be programmed for a higher temp than current water temp., and in "Standard Mode" see operations manual.

Check for heating error codes on spaside display and follow instructions

If heater is on its own GFCI breaker, check for tripped condition and reset

Consult gas heater manual for correct thermostat setting to work with 8000 series

Burned out elements are rare, but if all conditions for the heater have been checked, consult an electrician for power supply problems, and heater element operation

TROUBLESHOOTING

WATER TEMPERATURES HIGHER THAN SET TEMPERATURE

In warmer months, running the pump in prolonged timing cycles will add heat kinetically to the water. Shorten filter times in summer to prevent heat gain.

* NOTE that frequently in warmer months; expect spa/hot tub water to settle just below ambient air temps. During these months it's impossible to set a temperature on the spaside below the natural water temp. For this reason, you can experience water temps above your desired set temperature.

REQUIRED MAINTENANCE

Water chemistry maintenance information will be provided by your installer. Care should be taken to properly sanitize the water and balance the ph. Poor water conditions can cause permanent damage to heaters and pumps, that may void your warranty. Consult a local pool and spa professional for water treatment.

Filters and strainer baskets should be inspected and cleaned frequently, so it does not effect water flow and operation.

Plumbing when starting systems, after refilling, inspections are a good idea to find leaks in seals, valves, connections etc.

GFCI breakers should be tested monthly by following the manufacturer's steps for test and reset.

Equipment area should be kept clean, not allowing snow, leaves or other moisture holding material to buildup

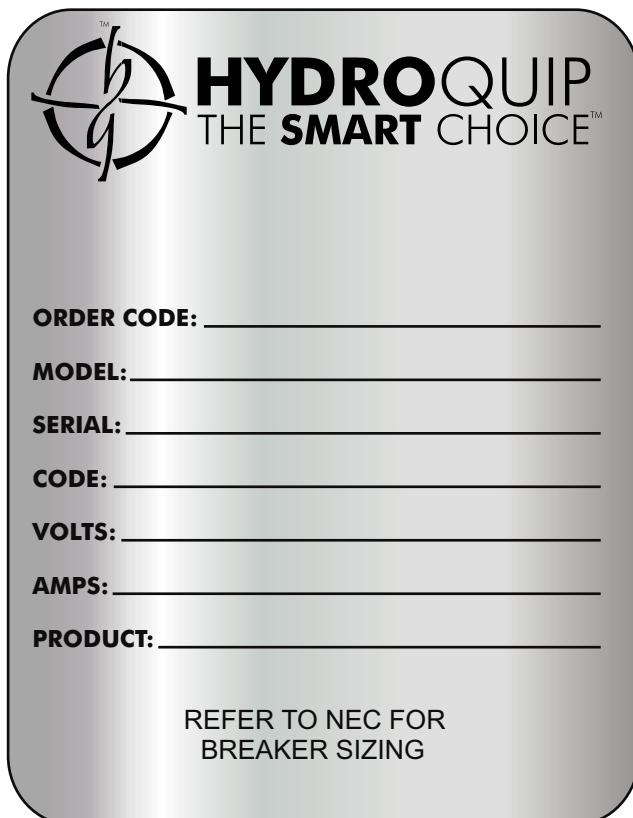
Electrical connections should be inspected and tightened by a certified electrician every few years. This includes bonding wires, conductors, breakers and terminal strip connections

When servicing the filters or replacing the water, power OFF the system at the GFCI or disconnect. Once service is complete, follow the startup procedures in this manual.

SYSTEM DATA LABEL

The system data label is located on the control box. This label is very important and contains information you will need to establish your electrical service. The voltage and amperage ratings are shown on the bottom of the label. Product, Model, Serial and Code numbers are also shown on the label.

Note: This information will be necessary if you should ever have to request warranty or any other type of service.



WARRANTY INFORMATION

Hydro-Quip warrants its products to the original purchaser to be free from defects in material and workmanship for a period of 1 year (12 months) from the original date of purchase, except as noted below.

Products which become defective within the warranty period will be repaired or replaced (at the option of Hydro-Quip) except for damage due to freezing, water chemistry, negligence, abuse, misuse, misapplication, unauthorized modification, improper installation, normal wear and tear or chemical attack.

This warranty extends only to normal, personal (non-commercial) usage by the original purchaser. Pump seals, o-rings, gaskets, air blower brushes are only covered for 90 days from original date of purchase.

Hydro-Quip will not be responsible for labor incurred in removing, inspecting or reinstalling of warrantable products. Hydro-Quip will not be responsible for any travel related charges or labor costs attributable to disassembly and reassembly of the spa, skirt, decking or any other materials enclosing the product, or attributable to difficulties in gaining access to the product.

Hydro-Quip will not be responsible for labor incurred for routine maintenance, adjustments or alterations to the calibration of electrical devices.

Any products which are claimed to be defective must be shipped freight prepaid to Hydro-Quip and the repaired or replaced product will be returned to the sender freight collect. When sent to Hydro-Quip, the product must be accompanied by the sales receipt or other proof of the purchase date as well as the sender's name, mailing address, daytime phone number and a detailed description of the defect as well as any other information relating to this claim.

Unless state law expressly provides otherwise, Hydro-Quip will only be responsible for repair or replacement of any of its products that are found to be defective as provided above, and will not bear the cost of any consequential damages. This warranty gives you specific legal rights but you may have other rights which vary from state to state.



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