

# SMARTOUCH DIGITAL

## USER MANUAL



701 W. Foothill Blvd., Azusa, CA 91702  
(626) 969-9655 Fax (626) 334-4809

[www.acc-spas.com](http://www.acc-spas.com)

Micro-processor technology is becoming a familiar name in the spa industry. Here, at Applied Computer Controls, we produced our first intelligent microprocessor based spa control system, in 1981-82. The SC-100 and SC-200; the forerunners of intelligent electronic spa controls.

Today, SmarTouch Digital includes more than 25 years experience. SmarTouch Digital, is a fourth generation microprocessor-based control system. A reliable energy efficient spa controller, so advanced but easy to operate, is conveniently located at your fingertips. A high intensity, oversized characters, LED display or our multi colored LCD display, keeps you informed of the spa temperature, time-of-day and elapsed time and a list of error codes, to inform and identify a malfunction.

Safety and reliability are built-in to meet or exceed the most stringent, up to date requirements set by (UL) Underwriters Laboratories.

SmarTouch Digital is the culmination of proven designs and extensive testing... from Applied Computer Controls.

SmarTouch Digital controls are microprocessor based electronic spa control systems and as such are susceptible to static discharge and high levels of humidity. To prevent premature control failure do not hose down, flood or allow water to enter the control box enclosure.

### **CAUTION**

High voltage levels exist inside the control box, they can cause injury and even electrocution.

**Only certified electricians or trained servicemen should have access to the components inside the box.**

There are no user serviceable parts inside the box. All programming is done at the spa side control panel without the need to access the inside of the box. If for some reason the control system needs to be serviced, please contact Applied Computer Controls for proper procedures.

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## INTRODUCTION

Thank you for buying a spa equipped with a SmartTouch Digital control system. Many years of experience went into the design of this family of controls. You can be assured your spa control system is the most advanced, it is highly reliable and will serve you for many years to come.

The control system has been designed with you, the user in mind. It is very easy to operate and requires a minimal effort on your part. You may use it just as it comes to you and without any programming. Yet you have the option of getting deeply involved in the inner workings of the control if you so choose. You can custom tailor it to fit your needs.

Please take the time to read at least the first section (next page) "IN A HURRY – READ THIS" portion of the manual before starting to use your spa for the first time. You can familiarize yourself with the rest of the manual at your leisure.

**SAVE THIS MANUAL.  
Make it available for other spa users.**

You should also have a spa user's manual which explains how to care for your spa. Please read and follow all instructions in your spa user's manual. Maintaining the proper levels of pH and the sanitizer will extend the life of your spa equipment. Improper chemical levels in the spa are sure to cause premature heater failure as well as failure of other components in the system. Failures caused by chemical imbalance are not covered by warranty.



## IN A HURRY - READ THIS

**SmarTouch Digital comes to you with a universal set of default settings. If you choose to keep these settings, then you only need to remember 2 things: how to set the spa temperature and to press the SET key whenever you are done using the spa.**

### **Setting Temperature**

The **UP(TEMP)** & **DOWN(TIME)** arrows.



Both buttons are used to select, increase or decrease temperature or time setting.

*Note: Both keys are active when pressed individually and held down 2 seconds, to eliminate accidental changes.*

Press and hold for 2sec. the UP (TEMP) arrow key.



Controller will display current spa temperature. Use the UP or DOWN arrow keys to select desired temperature.



\*To enter new temperature press → SET key



The controller will:

- Lock-in the new temperature.
- Display current spa temperature.

**IMPORTANT:** Always turn down the heat before you drain the spa.

\*Note:

Once you select the TEMP or TIME and the SET key is not pressed within 30 seconds the controller reverts to the previous setting and the change will not take effect.

### **The SET Key**

After using the spa, press the SET key to tell the micro controller you are done using the spa. It will then take over the spa's management, including the different filtration cycles, heat maintenance, economy modes and protection against freezing.

## SETTING TIME-OF-DAY

### Setting Time-Of-Day

Press and hold for 2 sec. the DOWN (Time) arrow key. 

Controller will display 12:00 noon. Use  OR  to set the correct time-of-day.

\*After every selection "Hours , Minutes" press → SET key. 

### Cool-Down Timer

A 30-second timer keeps the low speed jets, ON, after the heater turns OFF, to remove all residual heat from the heater element.

### User Timer

A built-in, 20 minutes elapsed-time clock switches off any active function.

### Economy mode. Water & Energy Management.

The **Economy** mode manages water temperature, filtration and energy consumption knowing "when" to heat to maintain water temperature.

The Economy mode starts when the heater is turned off and the spa is not in use.

Upon entering the ECONOMY mode the message "**ECON**" is displayed. During the Economy mode the spa controller is in stand-by, three hours at a time, monitoring and sampling the water temperature.

At the end of every Economy period which is 3 hours the controller activates the low jets only for 5 minutes to perform the following:

- 1-Filter and sanitize the water. Check your spa manual for the type of sanitizer in your spa.
- 2- Stabilize the water temperature and heat if necessary, in that case the low jets run more than 5 minutes for the duration of the heating cycle.

Important: Tie down your spa cover to minimize heat loss and to conserve energy.

Note: The message "**ECON**" is not an error code.

# SPA-SIDE CONTROL PANEL 2020

## FUNCTIONS



If primary pump is dual Speed. Press once to activate the low jets. Press again for high jets. A third depression turns the jets OFF, if the heater is off.



Press, for third or fourth pump. If auxillary pump is dual speed the AUX button functions as above.



Press, for air bubbles or second pump single speed.



Light switch ON/OFF

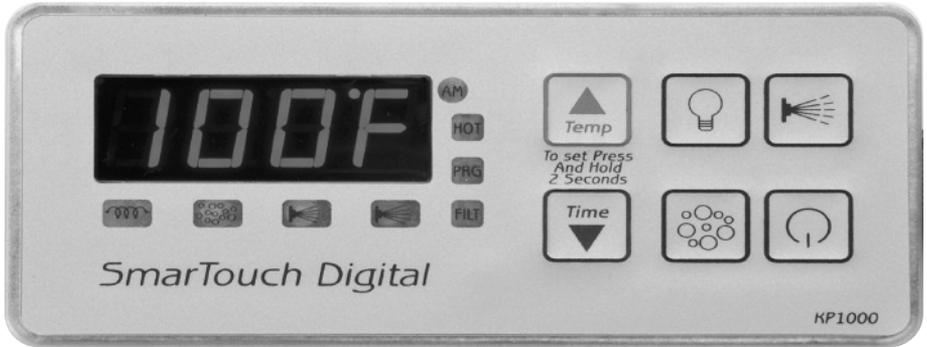
\*Optional

- TEMPERATURE
- TIME OF DAY



**FOR IN-SPA VIEWING OF THE TEMPERATURE DISPLAY:  
PRESS THE SET & UP ARROW KEYS TOGETHER AT THE SAME TIME**

## SPA-SIDE CONTROL PANEL 1000



### FUNCTIONS

#### JETS

Press once to activate the low jets. Press again for high jets. A third depression turns the jets OFF, if the heater is off.

#### \*AIR

Press, for air bubbles or second single speed pump if applicable. Button will be marked "AUX".

#### LIGHT

Light switch ON/OFF.

**FOR IN-SPA VIEWING OF THE TEMPERATURE DISPLAY:  
PRESS THE SET & UP ARROW KEYS TOGETHER AT THE SAME TIME.**

## SELF-DAIGNOSTIC CODES

### ERROR CODE EXPLANATION

**COLD** Water temperature below 40 F.

**OH** Water temperature above 108 F.

**SESH** Temperature sensor shorted.

**SEOP** Temperature sensor open or disconnected

**HLer** Overheat condition or overheat sensor is disconnected

**PSOL** Pressure-switch open with low speed jets ON.

**PSOH** Pressure-switch open with high speed jets ON.

**PSOC** Pressure-switch open with circulating pump ON.

## START-UP PROCEDURE

Once the spa is delivered and the electrical installation accomplished, the next step is to fill it and heat the water.

### IMPORTANT

*It is recommended to perform the following procedure when you drain and refill the spa, to protect the heater element.*

- Power must be turned OFF at the circuit breaker and at the G.F.C.I before you start.
- Open the access door and inspect all fittings to be tight and slide-valves fully extended.
- Fill the spa, using your garden-hose, to the proper water level (half way mark on the skimmer door).
- To apply power, push the RESET (ON) button at the G.F.C.I. & reset Circuit Breaker to the ON position.
- Push the Jets button at the Spa Side Control Panel activating the high speed pump. Keep pump running for at least three minutes to **purge the air out of the plumbing.**
- Once air bubbles stop coming out of the jets and the pump is primed select the desired temperature.

**IMPORTANT:** TURN DOWN THE HEAT BEFORE YOU DRAIN AND REFILL YOUR SPA TO PROTECT THE HEATER.

## WATER PRESSURE

FOR YOU TO KNOW.....!

PSOL or PSOH error codes = NO WATER PRESSURE

A pressure-switch protects the heater element when the water level drops below the recommended level. The switch is activated by water pressure in the heater housing, meaning the pump is running and there is water in the spa. In a new installation, or when the spa is drained then refilled, a small volume of air is trapped in the plumbing and in the heater-housing, lowering the pressure, disabling the pressure-switch, consequently shutting down the heater.

Or, the opposite is also possible, where the trapped air exposes part of the heater element but not enough to disable the pressure-switch resulting in a burnt element. To avoid damage to the heater, refer to the start-up procedure.

## FILTER CARTRIDGES

The filter cartridge(s) must be cleaned periodically. It should be totally submerged. If the top of the cartridge is above water level, air is sucked into the pump's intake causing pump surges, lower pressure and damage to the heater.

# IMPORTANT SAFETY INSTRUCTIONS

(I) **WARNING** – Risk of Accidental Drowning. Extreme caution must be exercised to prevent unauthorized access by children. To avoid accidents, ensure that children cannot use a spa or hot tub unless they are closely supervised at all times.

(II) **DANGER** – To reduce the risk of drowning from hair and body entrapment, install a suction fitting(s) with a marked flow rate that equals or exceeds the flow rate marked on the equipment assembly.

(III) **DANGER** – To reduce the risk of injury, do not remove the suction fittings. Never operate a spa or hot tub if the suction fittings are broken or missing. Never replace a suction fitting with one rated less than the flow rate marked on the equipment assembly.

(IV) **DANGER** – Risk of Electric Shock. Do not permit any electric appliance, such as a light, telephone, radio, or television, within 5 feet (1.5 m) of a spa or hot tub.

(V) **WARNING** – Risk of Electric Shock. Install at least 5 feet (1.5 m) from inside wall of hot tub or spa using nonmetallic plumbing.

(VI) **WARNING** – To reduce the risk of injury:

a) The water in a spa should never exceed 40°C (104°F). Water temperatures between 38°C (100°F) and 40°C are considered safe for a healthy adult. Lower water temperatures are recommended for young children and when spa use exceeds 10 minutes.

b) Since excessive water temperatures have a high potential for causing fetal damage during the early months of pregnancy, pregnant or possibly pregnant women should limit spa water temperatures to 38°C (100°F).

c) Before entering a spa or hot tub, the user should measure the water temperature since the tolerance of water temperature-regulating devices varies.

d) The use of alcohol, drugs, or medication before or during spa or hot tub use may lead to unconsciousness with the possibility of drowning.

e) Obese persons and persons with a history of heart disease, low or high blood pressure, circulatory system problems, or diabetes should consult a physician before using a spa.

f) Persons using medication should consult a physician before using a spa or hot tub since some medication may induce drowsiness while other medication may affect heart rate, blood pressure, and circulation.

(VII) (For equipment assemblies with a gas heater) **WARNING** – Risk of Suffocation. This equipment assembly uses a gas heater and is intended for outdoor use only unless proper ventilation can be provided for an indoor installation.

(VIII) (For equipment assemblies with a blower) **WARNING** – Install blower no less than 1 foot (305 mm) above the maximum water level to prevent water from contacting electrical equipment.

SAVE THESE INSTRUCTIONS.

## PROGRAMMING

SmartTouch Digital comes with factory settings. Programming the SmartTouch controller is optional. The following options are necessary only if you have certain requirements or you need to increase the filtration and heating cycles.

***Parameter Programming*** is a means by which the spa owner / user can change the various timing elements and calibrate temperature. The process is simple and intuitive. Only 3 keys are used: UP, DOWN, and SET. To program one or more parameters follow the outlined this procedure:

1. Press SET and DOWN keys together. The first message in the menu, FP1 will be displayed.
2. Use the UP & DOWN keys to scroll thru the messages in the menu.
3. Press the SET key to display the current value associated with the current message.
4. Use UP or DOWN keys to increase or decrease the value.
5. Press SET to lock in the new value and return to menu.
6. If another item needs programming go to number 2 above.
7. To Save changes scroll to message SEND and press SET.
8. To discard changes and restore previous values scroll to message CANC and press SET.

The menu of the parameters is circular. Scrolling is from first to last or from last to first.

When in programming mode please note that this mode will be cancelled if there is no key activity for a period of 60 consecutive seconds. Programming mode is aborted and all changes will be restored to previous values.

On the following page is an example of how to program a filtration period. When in programming mode you may program as many parameters as needed.

## SETTING FILTRATION PERIODS & SILENT MODE

### FP1, FP2, FP3, FP4 & SIL

**BEFORE YOU START THIS PROCEDURE PLEASE MAKE SURE YOU SET THE CORRECT TIME-OF-DAY.**

#### **Note the a.m. LED light**

- Press SET & DOWN arrow keys together **at the same time.**
- Code **"FP1"** is displayed.
- Press the SET key.
- Enter the desired start time to begin the First Filtration Period FP1. Enter the hour then press "SET". Enter the minutes then press "SET"
- Press UP arrow and go to code "FP1d".
- Press "SET". Enter the number of hours or the duration of the First Filtration Period in minutes. Maximum is 4 hours, then press "SET".
- Repeat above procedure for FP2, FP3, and FP4 if necessary.
- Press UP arrow (ignore the rest of the codes) and go to code **"SEND"**.
- Press SET to exit and save the new values.

'UP ARROW'      KEY IS MARKED 'TEMP'  
'DOWN ARROW'   KEY IS MARKED 'TIME'

#### **NOTE:**

IF POWER TO THE SPA IS TURNED OFF OR INTERRUPTED PROGRAMMING FOR THE "FILTRATION PERIODS" IS NOT AFFECTED TIME OF DAY MUST BE RE-ENTERED.

## PARAMETER MENU LIST

Press momentarily the "SET" & "DOWN ARROW" keys at the same time to access the following options.

Msg	Min	Def	Max	Detail
FP1		12:00		Start time of filtration period 1
FP2		12:00		Start time of filtration period 2
FP3		12:00		Start time of filtration period 3
FP4		12:00		Start time of filtration period 4
<p>Note : If filtration periods overlap, the most recent period (last) is in the effect.</p>				
SIL		12:00		Start time of the silence period. This is a period which nothing will run. It overrides all filtrations, the economy cycle, and temperature sampling. Except if temperature drops below 40 degrees. A spa may be installed near a bedroom and need not come on at specific times.
FP1d	0	0	240	Duration in minutes FP1 timer will run.
FP2d	0	0	240	Duration in minutes FP2 timer will run.
FP3d	0	0	240	Duration in minutes FP3 timer will run.
FP4d	0	0	240	Duration in minutes FP4 timer will run.
SILd	0	0	12	Duration in hours the Silence Timer runs. Only a user may override the silence timer.

**Note :** Keep the value of any time to 0 to keep it from running. Filtration timers must be programmed first one first. If the FP1d (first) timer has a duration of 0, Auto Filtration will be in effect and all 4 programmed timers will be disabled.

<b>Msg</b>	<b>Min</b>	<b>Def</b>	<b>Max</b>	<b>Detail</b>
CLDN	30	60	180	Cool Down cycle in seconds. Whenever the heater is turned off the pump keeps running the extra seconds to even the temperature of the heater element and the surrounding water to prevent scale build up and premature heater failure.
ECL	60	180	240	Economy Cycle Length. Time in minutes to specify the intervals between spa temperature sampling when the spa is not in use. During this period the spa is in economy mode. Temperature is sampled at the end of the period. Press any key to cancel this mode.
CHCL	0	60	180	Channel Clear. Time in seconds to clear the air channel and the secondary pump(s) plumbing if the spa has not been used for a period of 24 hours. This prevents water stagnation in the plumbing.
UTO	10	20	60	User Time Out. The time in minutes from starting any device, after which all devices will be turned off, and the spa put in "not in use mode". If you should leave the spa with a pump or light running, it will be turned off after the specified time.
PUF	60	120	180	Post Use Filtration. Time in minutes to perform Post Use Filtration this is the optimal time to filter the spa. When you have finished using the spa, that is when it needs filtration the most. Press the SET key to turn off all functions and start filtering.. This cycle is performed only once and after pressing the SET key. It is in addition to the standard filtration cycles. Pressing any other device key will cancel this function.

<b>Msg</b>	<b>Min</b>	<b>Def</b>	<b>Max</b>	<b>Detail</b>
CALB	198	208	218	This is not a time element. It is one of the distinctive features of the Smartouch Control System. The number is internal and is indicative of what the processor sees as temperature. It is used to calibrate the temperature reading. Increase this value by 1 to decrease the displayed temperature by $\frac{1}{2}$ a degree. Decrease this number by 1 to increase displayed temperature by $\frac{1}{2}$ a degree. For example the controller is displaying a temperature 2 degrees lower than real temperature increase the number by 4 to get a correct reading. The total range of this parameter is 10 degrees Fahrenheit. Before doing a calibration Please read warning note at end of this page.
SEND				This menu message has no numerical value. Pressing SET while it is displayed records and saves all changes made to all parameters.
CANC				This menu message also has no value. Pressing SET while it is displayed discards all changes made to all parameters and restores last saved or previous values.

## **WARNING**

The recommended maximum temperature of a spa is 100°F. The absolute maximum beyond which no person should ever be exposed to is 104°F.

## **ELECTRICAL CONNECTION INSTRUCTIONS.**

**NOTICE:** All spa electrical wiring must be performed by a qualified licensed electrician and must meet all NEC (National Electrical Code) and state and local codes and requirements.

### **DANGER – RISK OF ELECTRIC SHOCK**

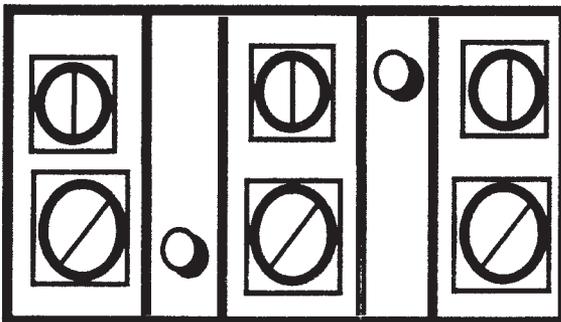
1. The lines carrying power to the spa must be dedicated to the spa and should not be shared with any other appliance(s).
2. All electrical wiring lines must originate from the electrical panel and terminate, hard wired, into the electrical wiring compartment. The use of extension cords or plug type termination is expressly prohibited and voids the warranty.
3. Do not use aluminum wiring. Use only copper wiring.
4. Wire gauge must be in accordance with NEC requirements for the distance from current source to spa and the current rating as stated on the ID label that is attached to the control enclosure.
5. All wiring must be shielded by a grounded metal conduit. The conduit must terminate at the electrical access compartment either from the bottom of the spa or through a hole in the side paneling of the spa.
6. For a 120 volt system the line wire (black) is connected to the terminal block lug labeled LINE1. The neutral wire (white) is connected to the center lug labeled NEUT, and the ground wire (green) is connected to the ground lug labeled G or GROUND.
7. For a 240 volt 4 wire system, connect Line1, Neutral and Ground wires as in #6 above. The fourth wire is the Line2 wire (red) and it is connected to the lug labeled LINE2.

# ELECTRICAL INSTALLATION INSTRUCTIONS

## BREAKER CAPACITY 50 AMPS 240V SINGLE PHASE

VOLTS	AMPS	HZ	PHASE
240	41	60	1
PERMANENTLY CONNECTED			
USE #6 AWG COPPER CONDUCTOR			

### 3-WIRE 220V CONNECTIONS + GROUND



GROUND

L1

NEUTRAL

L2

## BRANCH CIRCUIT BREAKER REQUIREMENTS

**240 Volts**      4 Wire System      **30/50 Amp 2 Pole Breaker**

**USE COPPER CONDUCTOR ONLY. #6 AWG WIRE**

**120 Volts**      3 Wire System      **20 Amp 1 Pole Breaker**

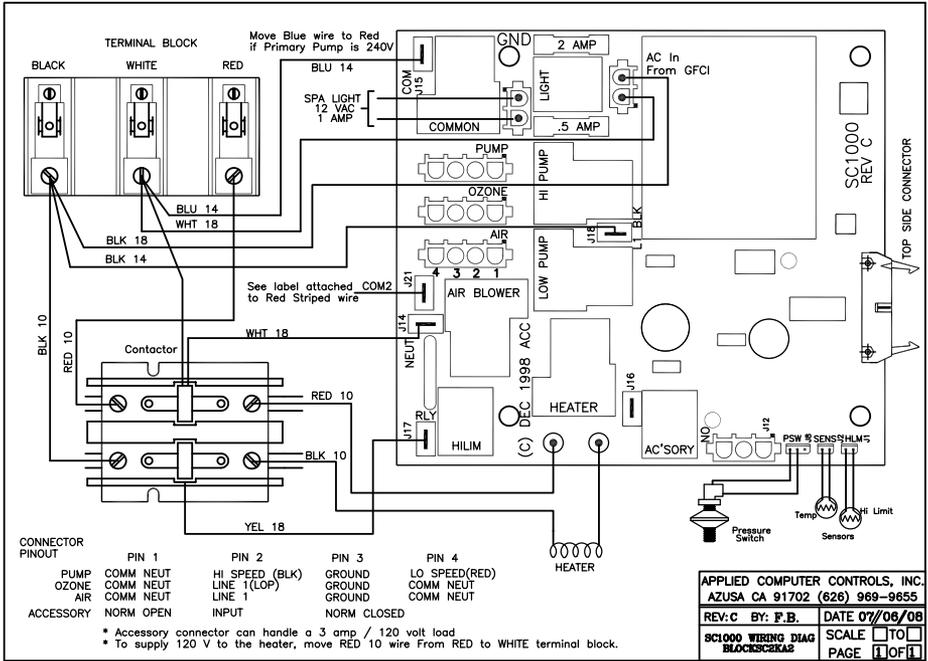
**CAUTION:** A new breaker must be used for a new spa installation. Do not use an existing or used breaker.

**GFCI:** All spa installations must be protected by a GFCI. If your spa control box does not include an integrated GFCI then you must use a GFCI breaker per National Electrical Code requirements.

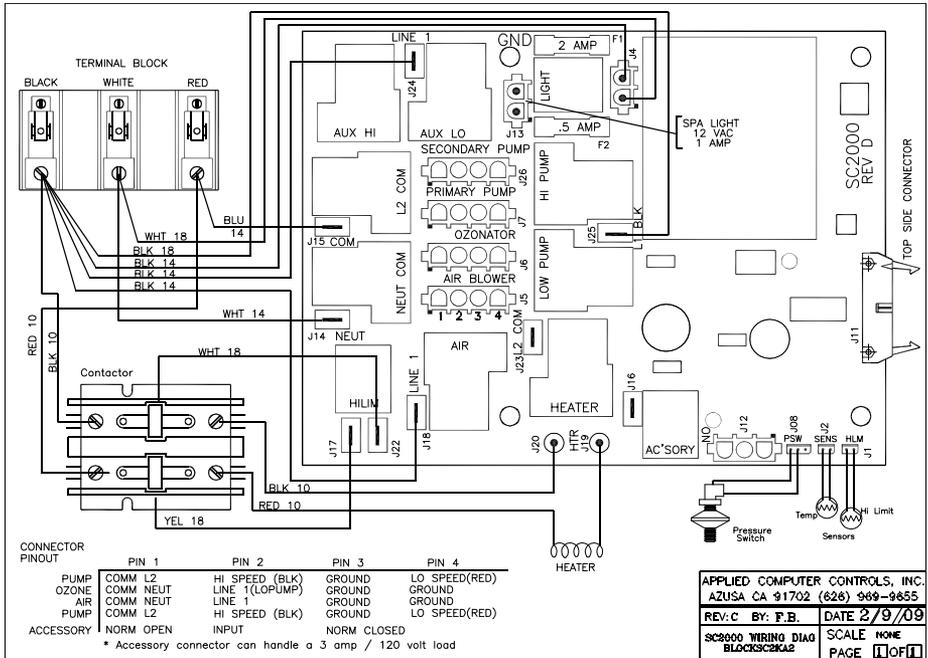
**120/240 Volt Conversion.** All spas are shipped configured for 240 volt (4 wire systems). Please check the nameplate on the control enclosure to identify the type of system in your spa. If the nameplate indicates a 120/240 Volt type system, then it is possible to convert the spa to 120 volt operation.

**30/50 Amp Conversion.** Some homes may have limited power service. It is possible to operate a 240 volt spa system using a 30 amp breaker. Connect 240 volt power to the system as previously described, then set it to operate in the low power mode.

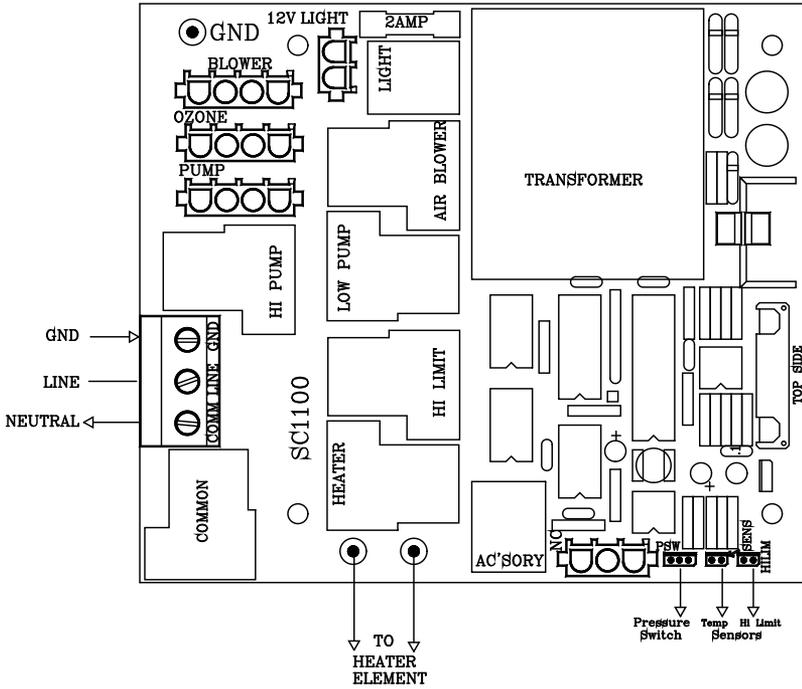
**Note:** Only experienced service personnel should perform conversions. Improper modifications may cause damage to the control system and/or the attached heater and pump motors.



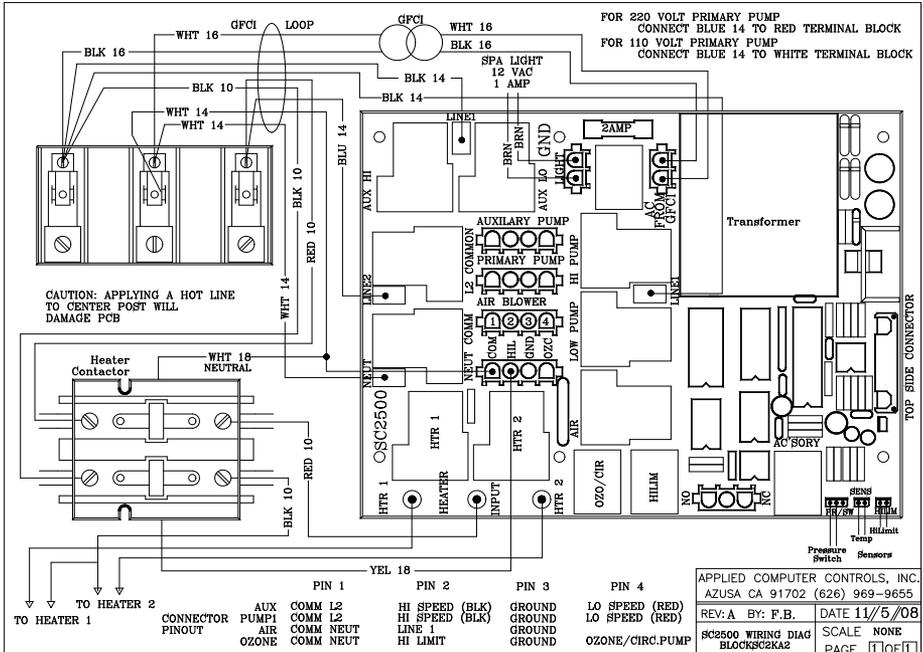
## WIRING DIAGRAM FOR SMTD 1000



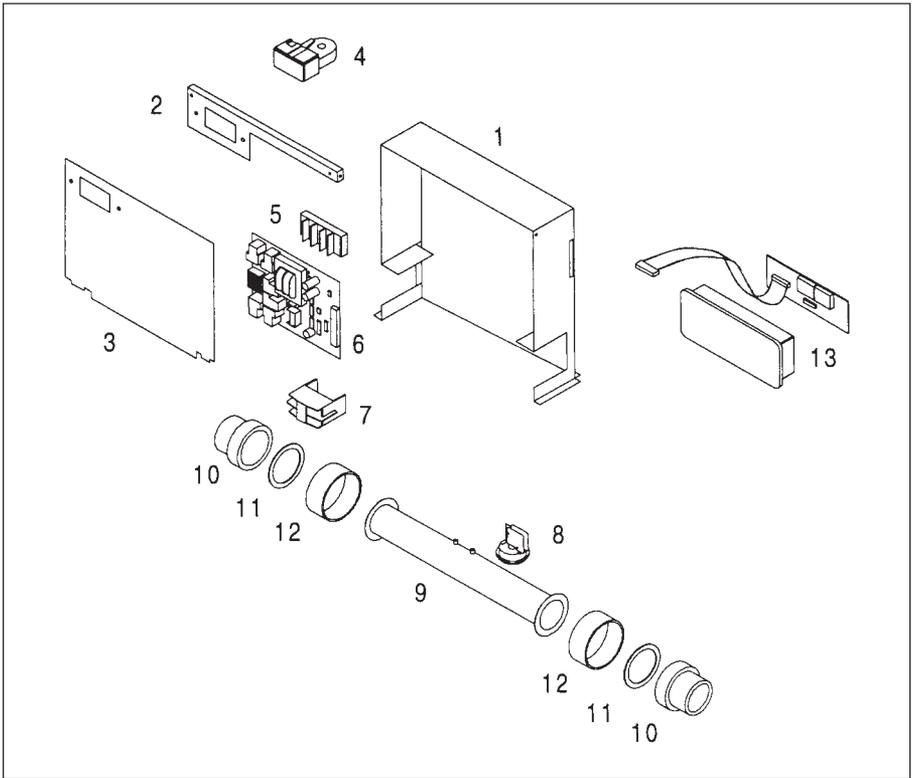
## WIRING DIAGRAM FOR SMTD 2000



WIRING DIAGRAM FOR SC-1100 (JR.)

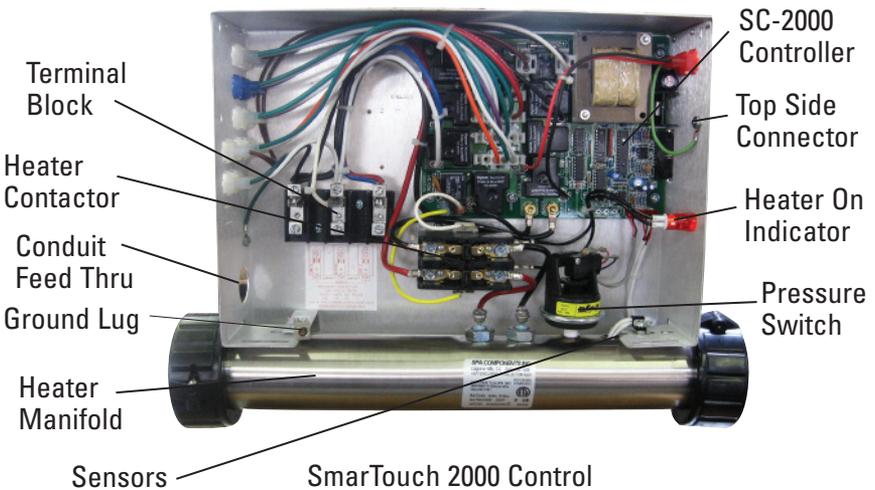
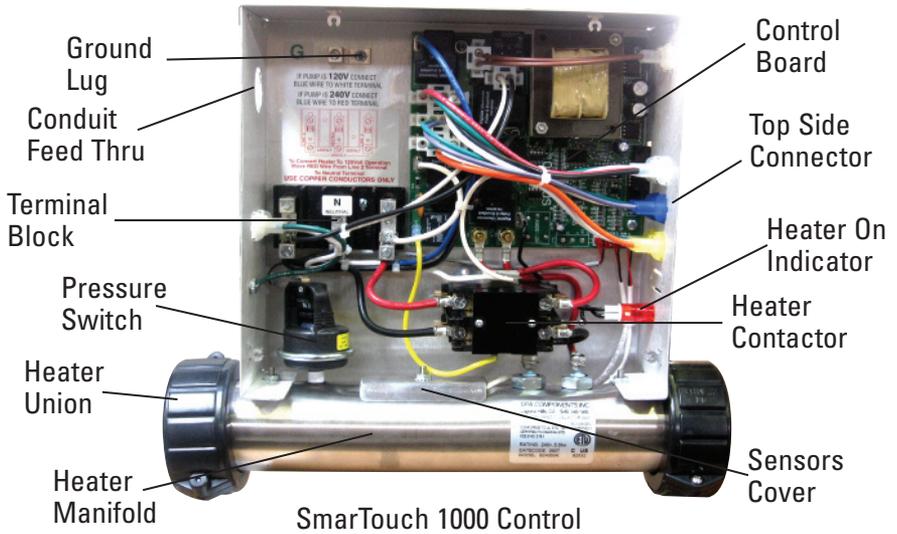


WIRING DIAGRAM FOR SC-2500A



SmartTouch Digital Typical view - exploded

1. Enclosure Box
2. GFCI Flange
3. Cover Plate
4. GFCI (optional) - 120 volt 20 amp or 240 volt 50 amp
5. Terminal Block - 2 position or 3 position
6. Printed circuit control board - SC2000, SC1000, SC1100Jr
7. Heater contactor
8. Pressure Switch
9. Stainless steel heater manifold tube
10. Heater union, male fitting.
11. Gasket
12. Heater union, female fitting
13. Spa side control assembly





5.5"



7"



### SmarTouch Digital

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SmarTouch Digital 1000, 2000, 2500.