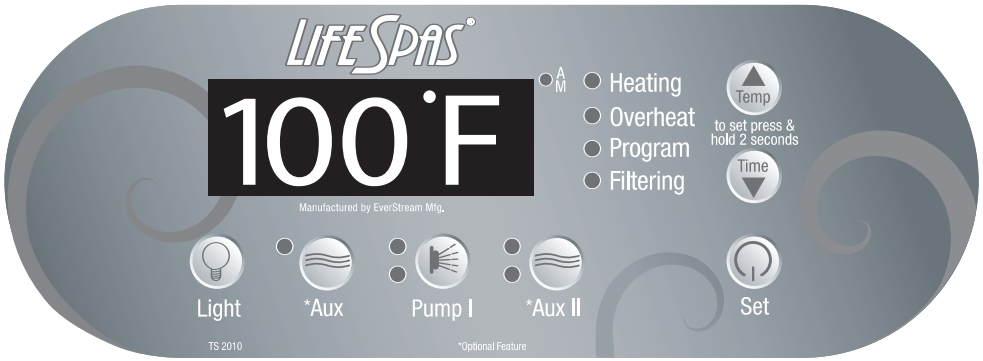
TS 1010 • 3” x 6.5”



TS 2020 • 3.5” x 9”

LIFESPAS®

LifeForce™

Digital Controller User Manual

For Sales, parts, Accessories and Serivce, Go to www.LifeSpas.com for a dealer near you.
LifeSpas Corporate Office (909) 606-8884 • Fax (909) 606-8820

Manufactured and Warranted by EverStream Manufacturing
4506 Panorama Point Road • Anderson, CA 96007

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Life Force 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.

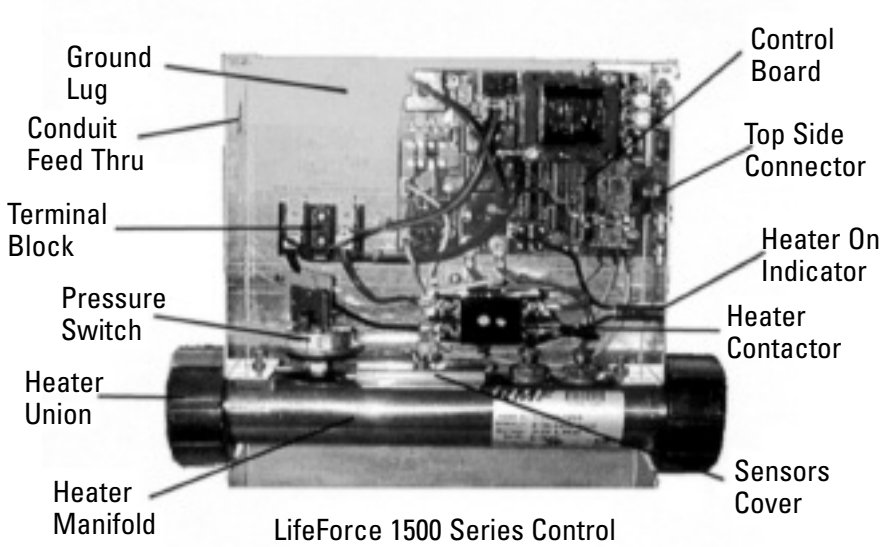
Only certified electricians or trained servicemen should have access to the components inside the box.

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 your LifeSpas dealer for proper procedures.

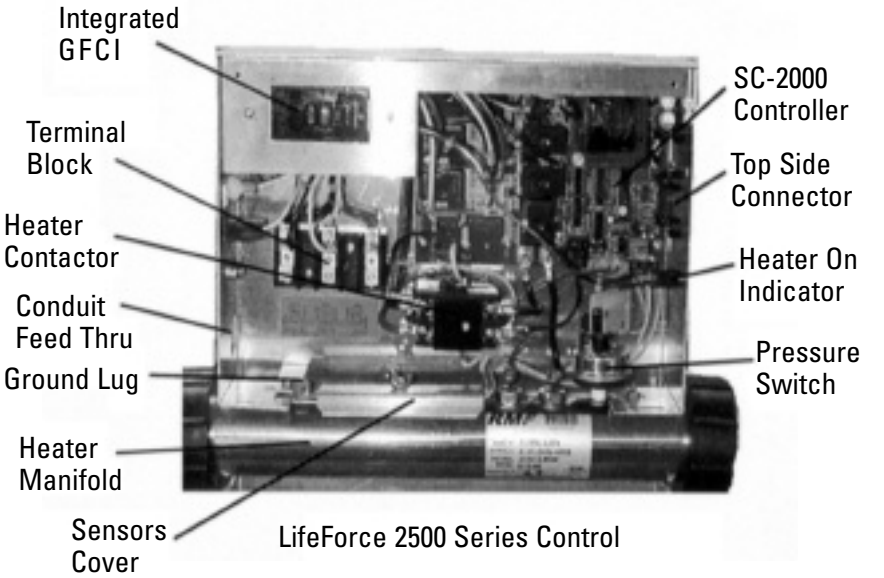
Model # _____ Serial # _____

Software Rev # _____ Purch Date _____/_____/_____

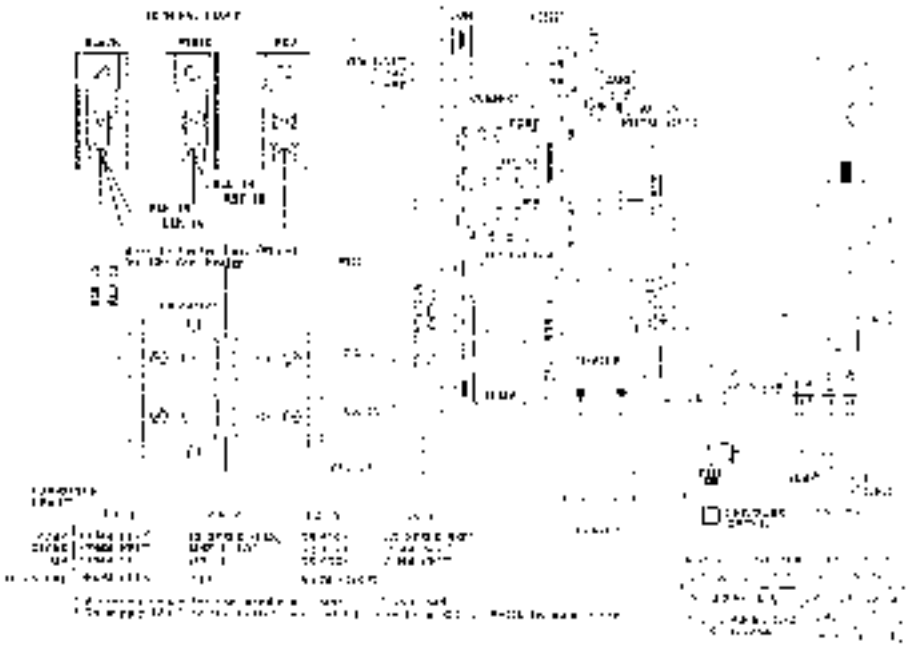
Device	120V	240V	1Sp	2Sp	12V	Installed
Primary Pump	☐	☐	☐	☐		☐
Circulating Pump	☐	☐	☐	☐		☐
Second Pump	☐	☐	☐	☐		☐
Third Pump	☐	☐	☐			☐
Air Blower	☐	☐	☐			☐
Spa Light	☐	☐			☐	☐
Fiber Optic Light	☐	☐			☐	☐
Fiber Optic Wheel	☐	☐			☐	☐
Spa Mister	☐	☐			☐	☐



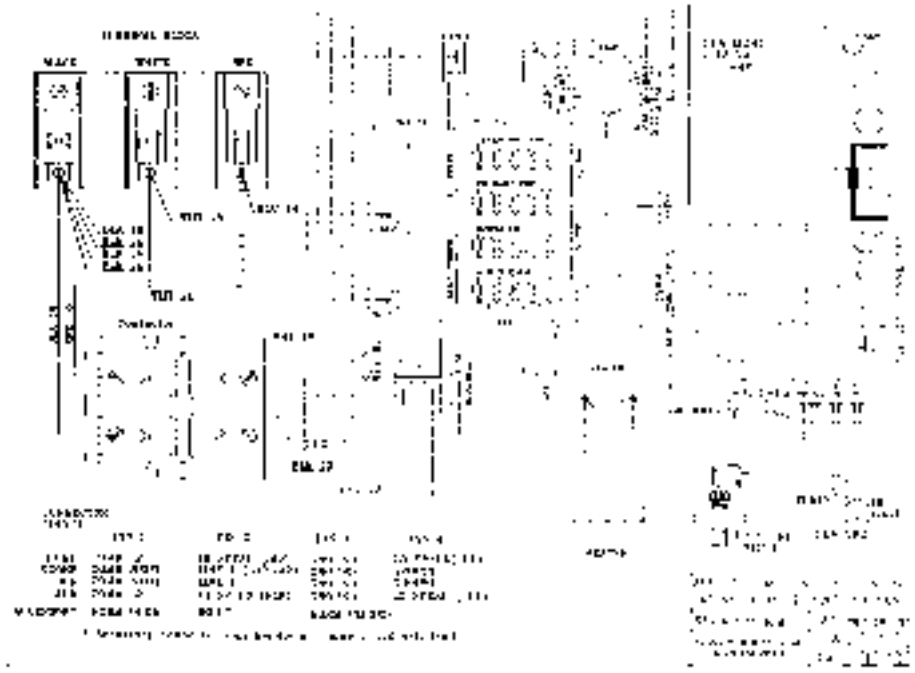
LifeForce 1500 Series Control



LifeForce 2500 Series Control



WIRING DIAGRAM FOR LFD 1500



WIRING DIAGRAM FOR LFD 2500

TABLE OF CONTENTS

INTRODUCTION

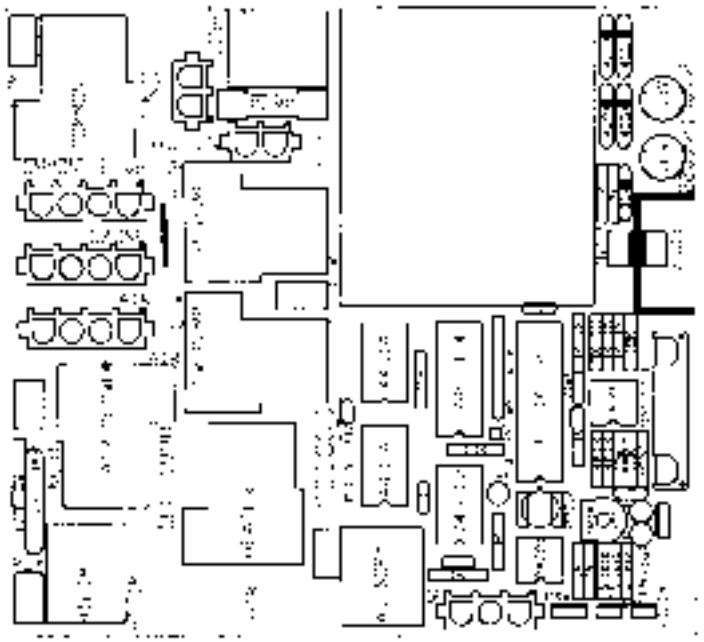
Thank you for buying a spa equipped with a Life Force Digital control system. Many years of experience went into the design of this family of controls. You can be assured your spa control system is quite advanced, it is highly reliable and will serve you for many years to come.

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.

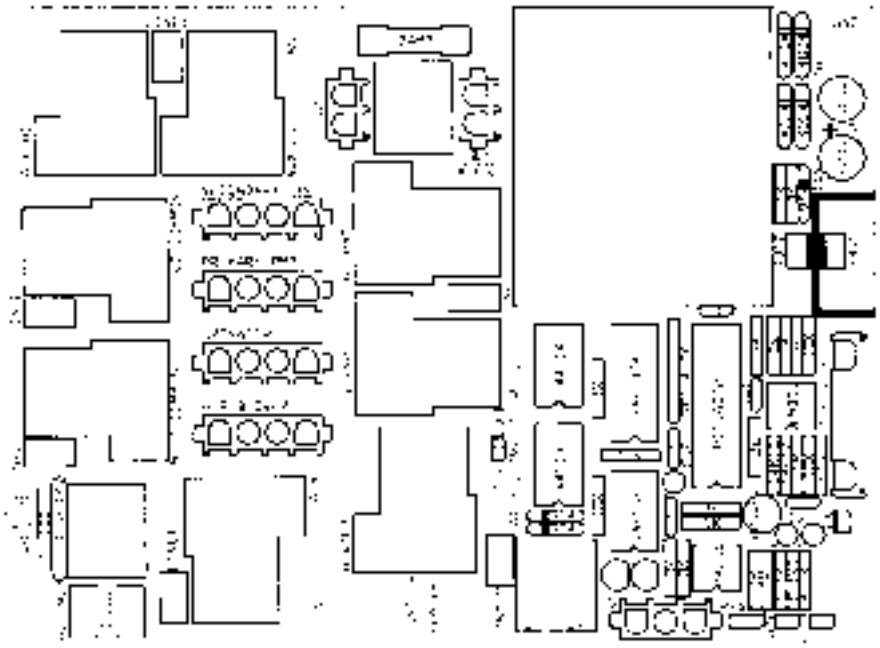
Please take the time to read at least the first section (next page) "IN A HURRY – READ THIS" portion of the manual before starting to use your spa for the first time. You can familiarize yourself with the rest of the manual at your leisure.

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

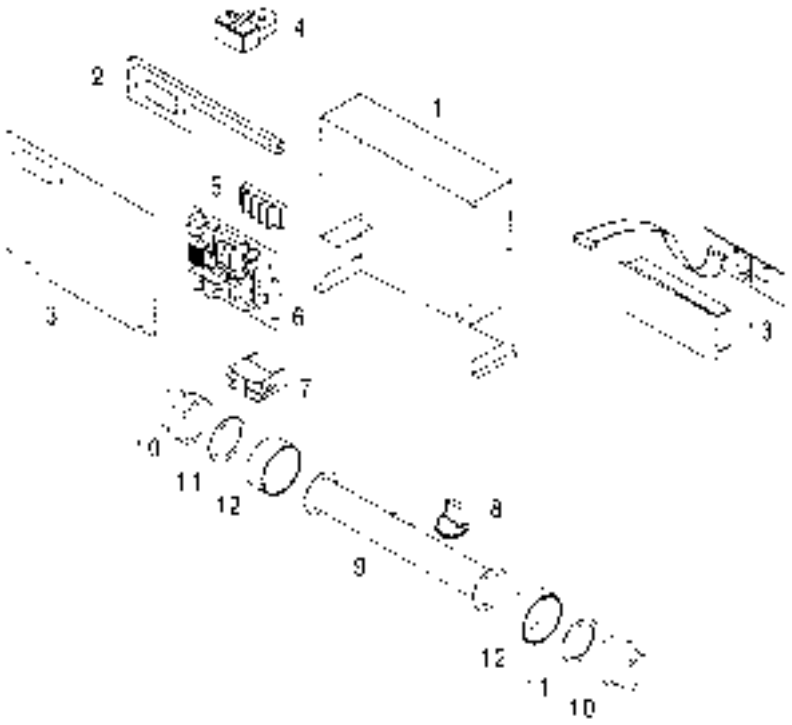
You should also have a spa user's manual which explains how to care for your spa. Please read and follow all instructions in your spa user's manual. Maintaining the proper levels of pH and the sanitizer will extend the life of your spa equipment. Improper chemical levels in the spa are sure to cause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



LC-1500 Control Board



LC-2500 Control Board



LifeForce Digital typical view - exploded

1. Pressure 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

IN A HURRY – READ THIS

For those who don't like to read manuals or would like to read the manual later, please read at least the following section and all safety & warning information from your spa owner's manual.

LifeForce 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

- Press and hold the TEMP key for 2 seconds. Release all keys. The display will flash the current selected temperature.
- Using the TEMP and TIME keys (UP and DOWN arrows) scroll to the desired temperature.
- Press the SET key to lock in the new selection.

CAUTION: TURN DOWN HEAT BEFORE YOU DRAIN THE SPA.

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. The controller remembers when you pressed the SET key and in anticipation of your next usage will perform a 3 hour Auto Filtration cycle and heat if necessary before your next spa use.

Upon entering this mode the FILTERING light is turned on and a post use filtration cycle is executed – that is when the spa needs filtration the most. The default system setting includes a 3 hour economy mode (ECON) will be displayed, the pump will come on at most once every 3 hours to sample water temperature and heat if necessary.

LifeForce Digital is a family of intelligent, spa control systems. The rest of this manual will explain the function of each of the keys on the control panel. It will also explain all the error messages that you may encounter

Time Of Day (TOD)

LifeForce Digital maintains a 12 hour AM / PM internal real time clock TOD (Time Of Day). The clock based on the line frequency. There is no battery backup and whenever the power is turned off, TOD is no longer correct. It defaults to 12:00 AM whenever the power is turned on.

If you set TOD then LifeForce will display time every first 10 seconds of each minute. If TOD has not been set then it will not be displayed.

Setting TOD (Optional)

1. Press and hold the TIME key for 2 seconds. Current TOD will be displayed with the hour portion flashing.
2. Release the TIME key.
3. Using the TEMP and TIME keys scroll up and down to the desired hour. - Notice the AM / PM Led.
4. When the correct hour and AM / PM are displayed press the SET key to lock in the new hour.
5. The display will now flash the minutes portion of current TOD.
6. Using TIME and TEMP scroll to the desired minutes.
7. When the correct minutes are displayed press the SET key to lock in the time of day (hours and minutes)

Note : TOD is the only parameter in LifeForce Digital that is not preserved on power down. On power up it will default to 12:00 AM, all other parameters are restored to the their last setting.

BRANCH CIRCUIT BREAKER REQUIREMENTS

240 Volts 4 Wire System **30/50/60 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 (3 or 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 (talk to your dealer or service technician regarding conversion), 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.

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.

THE CONTROL PANEL

The control panel is normally installed on the lip of the spa for easy and convenient access. Within the panel housing is a 4 digit LED display used to communicate to the user spa temperature, TOD, elapsed user time, programming, status – diagnostic and error codes and messages. There are 2 different size panels. They are interchangeable. The TS2010 Series panel can have up to 7 keys, the TS1010 Series panel will have at most 6 keys. These are membrane type switches which when depressed generate a signal the the microprocessor will interpret and act upon. The switches are labeled and have specific functions. They are divided into 2 groups:

Device Control Group: Pump(s), AUX & Light.
Status Control Group: Up & Down Keys & the Set Key.

Note: If any of the keys is pressed and held closed for longer than 20 seconds, that key will be disabled and becomes non-functional. After releasing the key, it will be reactivated after 20 seconds. This is to prevent a collapsed or defective key from locking up the system.

DEVICE CONTROL KEYS

There are up to 4 device keys, PUMP 1, *AUX, *AUX II & LIGHT. Your spa will have at least one water pump. Optionally your spa may have an air blower, a second pump and a spa light. It may also have an optional L.E.D. light setup. If your spa does not have a specific device please disregard the function of that device. The duration for every device when activated is 20 minutes.

Primary Water Pump

Each spa should have at least one primary water pump which is usually a dual speed pump. The low speed is used to filter the spa. Also while the spa is being heated or there is an error condition, the low speed circulates the water and you will not be able to turn it off.

The **PUMP I** key (switch) on the control panel is a 3 position switch: Low Pump, High Pump and Off. Each time the key is pressed, the next function is executed. If your primary pump is a single speed pump then only the high pump will be activated. 2 LED indicators, LO & HI inform you which speed is on.

> **Note:** If your spa is equipped with a (optional) circulating pump it will be used for filtration and heating instead of the low speed pump.

**AUX*

If your spa is equipped with an (optional) air blower (bubbler), it is activated by the ***AUX** key. This is an ON/OFF key. An LED will indicate when the optional air blower is on.

**AUX/Auxiliary Pump(s)*

Your spa may be equipped with 1 or 2 more pumps. If you have an (optional) second pump, it could be a single speed or a dual speed.

If you have a (optional) third pump then both the second and third pumps must be single speed. The function of the ***AUX II** key changes with the number and type of auxiliary pumps used. Please consult with the table on the following page for the proper sequence of activation.
If pump and *AUX II pumps exceed 12 AMPS each, with 50 AMP breaker, heater shuts off with both pumps running. You must use a 60 AMP breaker to run heater at the same time or heater will shut off.

Spa Light

The **LIGHT** key can also be a multifunction key. In its simplest configuration the **LIGHT** key is a simple on/off switch. It turns the spa light and the accessory, if one is attached, on/off together at the same time. Alternatively the LIGHT key may be programmed as a 3 function key. Pressing it once will turn the spa light on. Pressing it a second time will turn on the attached accessory, while the light is still on. Press it a third time and both spa light and accessory will go off.

The table on page 9 summarizes all the possible device key combinations. Please note that your spa may not necessarily have all these devices attached.

Msg	Min	Def	Max	Detail
CALB	194	204	218	This is not a time element. It is one of the distinctive features of the LifeForce Control System. The number is internal and in 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 ½ a degree. Decrease this number by 1 to increase displayed temperature by ½ 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 104°F. The absolute maximum beyond which no person should ever be exposed to is 108°F. When you calibrate the spa temperature you are doing so at your own risk. Obtain an accurate medical thermometer to check against. Please contact your LifeSpas dealer for proper procedure or if you do not feel confident.

Msg	Min	Def	Max	Detail
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. When you have finished using the spa, that is when it needs filtration the most. Press the SET key to turn everything off and start this cycle. 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.

SUMMARY OF FUNCTIONS FOR EACH DEVICE

Key	Device	1	2	3	4
	Single speed pump	ON	OFF		
PUMP 1	Dual speed pump	LOW	HIGH	OFF	
	*Dual speed with Circ pump *Circ pump is independent	LOW	HIGH	OFF	
***AUX**	*Single speed air blower	ON	OFF		
	*One single Speed pump	ON	OFF		
***AUX II**	*One dual Speed pump	LOW	HIGH	OFF	
	*Two Single speed pumps	P1	P1&2	P2	ALL OFF
	*Spa light	ON	OFF		
LIGHT	*Spa Light & Accessory	ON	ON		
	*Spa Light & Accessory 3 Function	ON OFF	OFF OFF		

*Optional Feature

Table 1 – Device keys summary of functions

The four device keys, PUMP 1, *AUX, *AUX II and LIGHT are exclusive, when one is pressed, no other key may be pressed simultaneously. You must release the pressed key before you may press another key. Also these keys do not repeat.

If you press and hold a key for more than 20 seconds, that key will be considered defective (collapsed) and will be deactivated and ignored by the system. When released, the key will stay inactive for 20 seconds before it is recognized and activated.

*Optional Feature

STATUS CONTROL KEYS

The keys in this group are used to communicate to the controller system settings and option selection(s). There are 3 keys in this group and 3 functions that are combinations of these keys:

Key Press	Function
TEMP (up arrow)	Prog Temp, + or Next
TIME (down arrow)	Prog TOD, - or Previous
SET key	Select or Accept, Enter
SET & TEMP	Invert display

Table 2 – Status Control Keys Summary.

The **TEMP** key, which is also the UP ARROW key, is a repeat key if held down. Think of this key as "+ or next." Use it to:

- ◆ Press and hold for 2 seconds then release it to start desired temperature selection.
- ◆ During temperature setting press TEMP to increase selected temperature.
- ◆ When doing system programming press TEMP to scroll to the next message.
- ◆ After message selection, the system displays the associated value, press TEMP to increase that value.

Note: When the display is inverted, you will be able to read the display from inside the spa; the keys will retain their functions and will not be inverted. The UP ARROW will still function as the UP ARROW, even though, when you look at it from within the spa, it appears to be the DOWN ARROW. The same also applies to the rest of the keys.

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
				Note : If filtration periods overlap, the most recent period (last) is in the effect.
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.

Example: program filtration period 2 to start at 5:45 PM

Press	Display	Explanation
SET & DOWN	FP1	Start programming the display first message is Filtration Period 1.
UP	FP2	Scroll up to Filtration Period 2.
SET	12:00	Select FP2. The display shows the current FP2 start time with the hour position flashing.
UP	1:00	Increase the hour value by 1.
UP		5:00 Press UP key 4 more times or press and hold for auto repeat.
SET	5:00	The hour is set, the minute portion flashes.
DOWN	5:45	Press UP 15 times or press and hold for auto repeat.
SET	FP2	FP2 set to 5:45 PM & the current message is displayed again.
DOWN	FP1	Scroll to previous message.
DOWN	CANC	Previous message - if you press SET when CANC is displayed all changes will be discarded.
DOWN	SEND	Previous - save changes.
SET	Temp	Changes saved.
		Exit programming mode.
		Display current spa temperature, time or operating message.

The table on the following page is a list of all menu items, their minimum, default and maximum values and an explanation of the function of each parameter.

Note : Time parameters have two components, the hours and the minutes. When programming a time element , first the hour portion is programmed (flashing). When the hours are set press the SET key to program the minutes portion.

The **TIME** key, which is also the DOWN ARROW key, is also a repeat key. Think of it as "- or previous." Use it to:

- Press and hold for 2 seconds then release it to start setting the real time clock (TOD).
- During time setting press TIME to decrease the hours or minutes value that is being set.
- When doing system programming press TIME to scroll to the previous message.
- After selecting a message, the system displays the associated value, press TIME to decrease that value.

The **SET** key is equivalent to Select or Accept. It functions as an Enter key of a personal computer, it is the proverbial "hit any key to continue". Press the SET key to:

- After using the spa, press the SET key to tell the controller to take over the management of the spa.
- During temperature setting, press the SET key to lock in a new selected temperature.
- During time of day programming press the SET key to lock in the hour and the minutes.
- When a "HLer" error message is displayed, press the SET key to clear the error (if the cause has been corrected). Pressing the SET key, the user acknowledges that the cause of the hi limit error has been or will be corrected.

Note: UP is synonymous with TEMP and DOWN is the same key as TIME. These are used interchangeably and mean the same thing. Scrolling means pushing either the UP or the DOWN key to go to the next or previous item or value.

ERROR MESSAGES

There are 9 error messages that a Life Force may generate. Here is a list of these messages and what they indicate:

CoLd Temperature in the spa heater housing is below 40° Fahrenheit. Because spa temperature should never get this low, the status of the heater element is unknown. Therefore the low speed pump or circulation pump will run continuously until the temperature rises above 45°

OH OverHeat. The spa is at a temperature that is above 108°F. LifeForce will not accept temperature settings above 104°F. If for some reason spa temperature rises over the maximum level, Life Force will display a flashing 105°F to 108°F. The spa is still operational but hotter than any person should be subjected to. Please do not use your spa when the temperature is flashing or the OH message is displayed.

In the summer and especially in warm regions, ambient temperature may be high enough to overheat the spa naturally. Spas are usually well insulated and can store a lot of heat in the equipment compartment.

HLer Hi Limit Over Heat. LifeForce has a backup water temperature sensor called the HiLimit. If the sensor is disconnected or shorted or if the spa temperature should reach above 112°F, the HiLimit protection circuitry will force all spa functions off and will flash the HLer message on the display. It is not possible to use the spa when this error is in effect. When the error has been corrected, you must press the SET key to acknowledge that you, the spa user, are aware of the error condition and should have the proper repairs done.

PROGRAMMING

LifeForce Digital comes with factory settings. Programming the LifeForce is optional. The following options are necessary only if you have certain requirements or you need to custom program 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.

IMPORTANT SAFETY INSTRUCTIONS

READ AND FOLLOW ALL INSTRUCTIONS

WARNING

1. To reduce the risk of injury, do not permit children to use this product unless they are closely supervised at all times.

2. A wire connector is provided on this unit to connect a minimum 8 AWG (8.4MM2) solid copper conductor, between this unit and any metal equipment, metal enclosures of electrical equipment, metal water pipe, or conduit within 5 feet (1.5m) of the unit.

3. WARNING: For indoor use only. This unit is not intended for outdoor use.

4. CAUTION: THE EQUIPMENT AND CONTROLS SHALL BE LOCATED NOT LESS THAN 1M (5FT) HORIZONTALLY FROM THE SPA OR HOT TUB.

CANADA

5. Attention: Maintenir une distance minimale, mesuree dans un plan horizontal., de 1M entre la cuve de relaxation et les appareils et commandes.

6. Only a licensed electrician can install power to the spa.

7. Spa power supply installation must include a properly rated GFCI/Circuit Breaker, as per label on control box enclosure.

8. Supply lines must be properly sized as per National Electric Code.

SEoP Sensor Open or disconnected and LifeForce cannot determine the spa temperature. The heater is disabled but the spa is operational. The sensor must be replaced or reconnected for this message to go away.

SESH Sensor Short. The sensor is shorted and is non functional. Temperature cannot be determined, the heater is disabled, but the spa is still operational. Sensor must be replaced to get rid of this message.

PSoC, PSoL, PSoH Pressure Switch Open with Circulating, Low or High pump(s). The pressure switch is a device sensitive to pressure inside the heater manifold. Pressure in the heater manifold is generated by a pump pushing water through the manifold. If one pump is running and the pressure switch does not sense any pressure then there is an indication of no water flow. To prevent the heater from being turned on when there is no water running through, the heater is turned off and one of these messages will be displayed indicating which pump is supposed to be running.

A pressure switch error may also be indicated if there is an air lock in the pump. An air lock may happen whenever the spa is drained and refilled with water, or if the water level in the spa is so low as to permit air to be sucked in by the pump. To bleed an air lock; switch off power, loosen one of the pump fittings a quarter of a turn. You will hear the sound of escaping air, then water will start dripping. Re-tighten the fitting.

ToE Time Out Error. It is not likely that you will ever see this error. It indicates that the system's heartbeat is out of control, all devices will be shut down and the spa is unusable. This message will rarely ever occur, if it does, please contact your Life Spas Dealer.

ELECTRICAL INSTALLATION INSTRUCTIONS

NOTICE: All electrical wiring must be performed by a qualified, licensed electrician in order to meet NEC, (National Electrical Code) state and local codes.

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 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.
3. 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 lug labeled NEUT, and the ground wire (green) is connected to the ground lug labeled G or GROUND.
4. For a 240 volt 4 wire system, connect Line1, Neutral and Ground wires as in #6 above. The fourth wire is the Line2 wire and it is connected to the lug labeled LINE2.
5. This unit is a "Permanently Connected Equipment Assembly with Pump(s), Heater, Blower and Control".
6. The lines carrying the power to the spa must be dedicated and should not be shared with other appliances. **Use copper wiring only. Use #6 AWG conductors.**
7. A pressure wire connector is provided on this unit to connect a minimum 8 AWG (8.4 mm2) solid copper conductor between this unit and any metal equipment, metal enclosures of electrical equipment, metal pipe, or conduit within 5 feet (1.5m) of the unit.
8. The electrical supply for this unit must include a suitably rated GFCI/CIRCUIT BREAKER to open all ungrounded supply conductors to comply with Section 422-20 of the National Electric Code. GFCI is available and may be purchased with the spa.

9. A quick disconnect marked OFF must be readily accessible to the tub occupant, installed at least 5 feet (1m) from the tub.
10. All electrical wiring lines must originate from the main 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.
11. Minimum supply conductor ampacity must be 125 percent of the current rating stated on the ID label affixed to, equipment control enclosure.

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