

ZEDAR TECHNOLOGIES, INC.

Regency Spa Controller

Owner's Manual

10/19/2009

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1.0 PREFACE

1.0.1 Electrical Requirements

All Spa electrical wiring should be performed by a licensed electrician and must comply with all NEC (National Electrical Code) and state and local code requirements.

The electrical loads for connections to this system **MUST NOT** exceed the rating specified in this manual. Failure to comply with these specifications and/or improper wiring may cause hazardous operating conditions and/or damage to the controller.

1.0.1.1 Ground fault Circuit Interrupter (GFCI)

Since January 1994, a Ground Fault Circuit Interrupter is required by all electrical Spa installations. The National Electrical Code (NEC) also states that a service disconnects should be located near the Spa but no closer than 5 feet. A GFCI could be used for this purpose.

All 120 Vac Spa require a dedicated 20 Amps GFCI service connection, all 240 Spa require a dedicated 50 Amps GFCI service connection with a 6/3 AWG (four wire) all copper conductors. In order to conserve electricity we recommend using 240 Vac connections in all 240 Vac capable Spa.

It should also be verified that a dedicated service is used with no other circuits connected to it.

1.0.1.1.1 GFCI In-line wiring

- Black and Red wires feeding the GFCI are connected to a properly sized circuit breaker.
- White wire should be connected to the neutral bar and the Green is connected to the ground bar.

1.0.1.1.2 GFCI 240Vac 3 wire circuit

A 240 Vac 3 wire service could be used if it does not operate any 120 Vac devices.

- Black and Red wires feeding the GFCI are connected to a properly sized circuit breaker.
- White wire is not required and the Green is connected to the ground bar.

1.0.1.1.3 GFCI 120/240 Vac 4 wire circuit

A 240 Vac 4 wire service could be used if it does operate any 120 Vac devices.

- Black and Red wires feeding the GFCI are connected to a properly sized circuit breaker.
- White wire should be connected to the neutral bar and the Green is connected to the ground bar.

The White load wire must be connected to the neutral out terminal. Proper installation of the neutral wire is essential for proper operation. If not wired properly, the GFCI will trip when any of the 120 Vac devices is turned ON.

1.0.1.1.4 GFCI Concerns

If the GFCI does not stay engaged as soon as power is applied to the system, it could indicate that it is not wired correctly. Please verify that all the connections are correct, generally if the GFCI does not stay engaged, it is a wiring problem with the neutral wire.

The Neutral and the Ground wires cannot touch anywhere otherwise the GFCI will trip.

1.0.2 Risk of Electrical Shock

As a Spa owner some of the risks of electrical shock are but not limited to the following:

- All supply circuits must be disconnected before accessing the Relay Board Terminals. The cover should only be removed by a qualified technician.
- Do not operate the Spa with the controller cover removed.
- Use copper wire only while installing the system.
- Do not allow any electrical appliance: lights, telephone, radios, televisions etc within 5 feet of the Spa.
- Never try to operate any electrical device from inside the Spa.

1.0.3 Owner's Responsibilities

As a Spa owner some of your responsibility are but not limited to the following:

- Protect your Spa from freezing or any other damage.
- Do not permit children to use or access to the spa unless they are supervised at all times.

- Before entering the Spa make sure that the water temperature never exceeds 104°C (40°C). Water temperature between 100°F (38°C) and 104°F (40°C) are considered safe for adults use.
- Pregnant or possible pregnant women should limit Spa's water temperature to 100°F (38°C) since excessive water temperature has a high potential for causing fetal damage.
- The use of alcohol, drugs or medications before or while using the Spa made lead to unconsciousness that could lead to drowning.
- Persons with infections or sores should never use the Spa. Temperature of the spa may allow the growth of infectious bacteria if the system is not properly sanitized.
- Persons using medication, suffering from obesity, history of heart disease, low or high blood pressure, diabetes or problems with the circulatory system should consult a physician before using the Spa.
- Adults should never use the Spa alone, always enter and exit the Spa slowly.

2.0 OVERVIEW

The Regency Spa Controller is a microprocessor based system designed to provide the users with an efficient and effective way of managing their enjoyment time while using a spa. It has been designed to provide you with maximum flexibility during the spa use by allowing easy system programming that requires minimum effort. However it will allow you to configure the inner workings of the spa if you choose to. The Spa could be tailor to satisfy the user needs.

The Regency controller system package consists of:

2.0.1 Control Panel

This controller is installed on the spa consist of 10 push buttons (keys) that are used to control pumps, air blowers, lights, any other auxiliary equipment as well as to program the system. Some of its features are:

- One 2 lines 24 characters LCD display.
- 10 momentary buttons used to select operation and controller settings.
- Operating temperature 0°C to 85°C.

2.0.2 Relay Board

This board has been designed for installation below the Spa's skirt. It provides the user with the following features:

- Could control for 2 pumps, 2 blowers, 2 auxiliary, lights, ozone and heater.
- Inputs for sensing control switches.
- Inputs for temperature sensors.
- RJ45 connector for communication with the top controller.
- 120 or 240 Vac +/- 10% operation.

2.0.3 Temperature sensors.

The Regency system uses 2 temperature sensors: one sensor is installed on the heater surface to provide overheat/freeze protection and the second is used to monitor the water temperature.

2.0.4 System features

The Regency controller has been designed to meet all of the following conditions:

- When the water temperature is below the set point, the low speed will be turned on, the pressure switch will be detected to determine that water is flowing through the pipes and then the heater will be turned on.
- When the water temperature goes over the set point the heater will be turn on but the low speed pump will continually run for one minute.
- The Ozone generator will be turned ON only when the pump is running in low speed. It will be turned OFF if the pump is switch to high speed.

2.0.5 System Default Settings

All default settings of the controller including the date and the time of the day are retained after power is removed from the system.

2.0.6 System Recommendations

In order to keep your Spa in optimum condition we recommend:

- Keep you Spa user's manual which explain how to care for your spa.
- Maintain proper level of PH.
- Sanitize you Spa regularly; it will extend the life of your equipment.
- Keep proper chemical level in the Spa to prevent premature heater as well as other components failure.

Please use this manual as a reference while modifying the operation of your Spa.

3.0 CONTROL PANEL

The control panel is installed on the lip of the spa for easy and convenient access. The **Regency** model, consist of:

- 2 lines 20 character LCD display used to communicate the user Spa temperature, Time of the day as well as date during normal operation. It is also use during programming to convey all the information to the user.
- 10 membrane switches used to control all the different function of the Spa. They are divided in 2 group:

Spa Control keys:	Pumps, Air Blower, Spa light, Done, Extra.
Status Control keys:	Up, Down, Programming

Note

If any of the keys in the control board is held depressed for more than 30 seconds it will be disable, a message will be displayed indicating this failure; after the depressed key is released it will be reactivated. This feature will not allow the system to lock up because of a collapsed or defective key.

3.0.1 Spa Control Keys

There are 7 Spa control keys: Pump1, Pump 2, Air 1, Air 2, Done, Spa Light and Auxiliary.

A Spa should have at least one water pump; optionally it could have a second or third pump, an air blower, a mister or a fiber optic light setup and an extra device.

3.0.1.1 Water Pump 1 Key

Will control the primary pump which is usually a dual speed pump, the low speed is used to filter the Spa and/or to circulate the water while the Spa is being heated. A second depression of this switch will toggle between the high and the low speed of the pump. If your primary pump is a single speed (HIGH speed) only, this switch will turn the pump ON and OFF.

Note

If the Spa is equipped with a circulating pump only, it will be used for filtration and heating instead of the low speed pump.

3.0.1.2 Water Pump 2 Key

Will control a secondary pump On/OFF.

3.0.1.3 Blower 1 Key

Will activate the primary air blower (bubbler). It is an ON/OFF key

3.0.1.4 Blower 2 Key

Will activate the secondary air blower (bubbler). It is an ON/OFF key

3.0.1.5 Done Key

This key should be depressed after the Spa had been used. A depression of this key will signal to the microcontroller in the system that Spa's software management should take over and execute the filtration cycles, heat maintenance, etc.

3.0.1.6 Light Key

Will activate the lights used in the Spa. It is an ON/OFF key

3.0.1.7 Auxiliary Key

Will activate any device attached to the Auxiliary relay in the system board. It is an ON/OFF key

3.0.2 Status Control Keys

There are 3 status control key: UP, Down and Programming. Their function will be explained during the Spa Programming section of this manual.

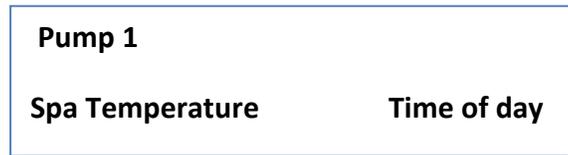
4.0 CONTROLLER OPERATION

4.0.1 Normal Operation

The Regency Spa controller is a very easy to operate. Upon installation the LCD controller will display defined as a default display:



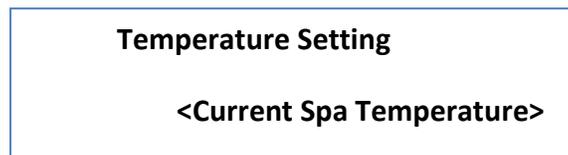
While using the Spa a depression of any of Spa control key the system will display the depressed key and when it is released it will come back to the default display. Example; if the Pump 1 is depressed the system will display:



After few seconds it will return to the default display.

4.0.2 Temperature Setting

A depression of either the Up or Down key will command the controller to enter the temperature setting mode by displaying:



Holding either key depressed will scroll the setting from 90 to 105 degrees Fahrenheit.

4.0.3 Spa Programming

Depressing the Programming key will command the controller to enter the programming mode by displaying:

Spa Programming

Wait few seconds

IMPORTANT NOTICE

*Once the programming mode is entered depressing the **Up** or **Down** key will allow the user to scroll through all the setting. If while the system is displaying a setting, and the **Programming** key is depressed the user will be allow to modify the setting using the **Up** or **Down** Keys. After the desire setting is selected a depression of the **Programming** key will save the entry by displaying:*

Saving Entry

<Programmed Entry>

*A depression **Done** key will clear the entry and the old values will be retained.*

Cancelling Entry

<Programmed Entry>

If while trying to program a setting; a key is not depressed for a period of 10 seconds the system will automatically exit the programming mode and the selected setting will not be saved in memory, it will display the following screen for few seconds and then the default screen .

Exiting

Programmed Mode

4.0.3.1 Clock Format

As described above after few seconds the system will enter the Programming mode and it will display:



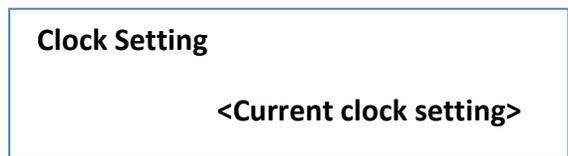
Clock modes are: 12 hours or 24 hours format.

If no changes are required a depression of either the Up or Down key will display the previous or the next available settings.

While on this screen is being displayed a second depression of the programming key will allow the user to set the desired clock mode by depressing the Up or Down keys.

4.0.3.2 Clock Setting

The next available setting will be the Clock Setting.

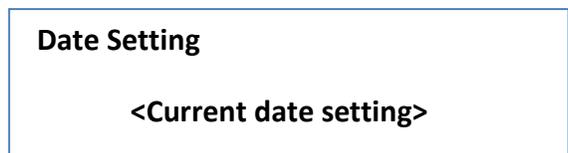


If the Clock format was set to the 12 HOURS format: a depression of the Programming key will allow the user to set the HOURS, a second the MINUTES, a third either PM or AM, a fourth will save the programmed value. Follow similar procedure for 24 HOURS format.

All the mentioned depressions have to be executed in order to set the time properly.

4.0.3.3 Date Setting

The next available setting will be the Date Setting.



While the above screen is been displayed a depression of the Programming key will allow to set the DAY of the week, a second the MONTH, a third the DATE, a fourth the YEAR, a fifth will save the programmed value.

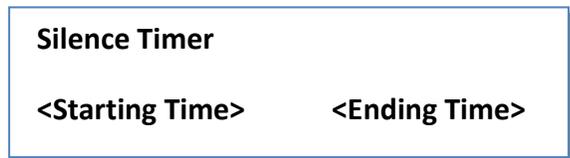
All the mentioned depressions have to be executed in order to set the Date properly.

4.0.3.4 Silence Timer

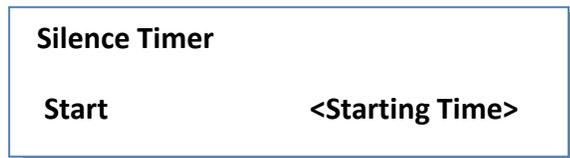
The next available setting will be the Silence Timer.

Silence timer is a period during which the system will be dormant, it will override the filtration cycles, as well as temperature sampling, except if the temperature drops below 40 degrees Fahrenheit. However, the user could still have full control of the system if it needs to use the Spa by simply depressing any of the keys. After using the spa it will return to the silence mode if required.

While the screen bellow is being displayed:



Upon depression of the Programming key the system will display:



And allow the user to enter the Silence Timer Starting Hours, next depression the MINUTES, next AM/PM if the clock mode was set to 12 hours format. Finally it will display the following screen:



Follow the previously described procedure to enter the Ending time. Please make sure that the last screen



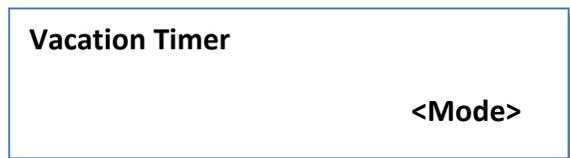
4.0.3.5 Vacation Timer

The next available setting will be the Vacation Timer.

The Vacation timer is used for a period during which the system will be dormant, it will execute the filtration cycles but not temperature sampling, except if the temperature drops below 40°F. .

However, similar to the Silence Timer the user could still have full control of the system if it needs to use the Spa by simply depressing any of the key, after using the spa it will return to the vacation mode if required.

While the screen bellow is being displayed:

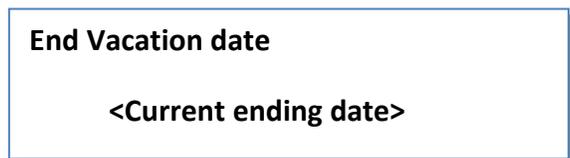


The modes are: OFF or ON (ACTIVE). The mode is selected by depressing the Programming Key and then either the Up or Down key to set the desired mode.

If the mode ON is selected the system will display:



A depression of the Programming mode will set MONTH, a second depression the DATE and finally the YEAR, next depression will command the controller to display:



While the above screen is displayed, follow the same previously described process to set the end of vacation date.

4.0.3.6 Spa Mode

The next available setting will be the Spa Mode. There are two Spa Modes: Auto, Manual.

Auto mode: Will allow the Spa controller will execute all the default function as programmed at the factory (**RECOMENDED MODE**).

Manual Mode: Let the user set all the spa parameters as follows.

The first parameter is the filter cycles, this screen will allow the user to set the number of filter cycles during an 24 hours period, the maximum number of cycles is 4 and could be set by depressing the Programming key and then either the Up or Down keys until the desire setting is obtained then saved by depressing the Programming key one more time:

Manual Mode	
Filter Cycle	<# of cycles>

Next screen is the cool down cycle; the maximum setting is 180 seconds. It is defined as the number of seconds the pump will run after the heater is turned off:

Manual Mode	
Cool Down Cycle	< #Seconds>

Next screen is the clear cycle; the maximum setting is 180 seconds. It is defined as the number of minutes the air blower will run to clear some stagnated water in its pipes:

Manual Mode	
Clear Cycle	<# minutes>

Next screen is the Post filtration cycle, the maximum setting is 180 minutes the minimum 30 minutes. It is defined as the number of minutes after the user exit the Spa.

Manual Mode	
Post Fil	<Ending Time>

Next screen is the User Time Out; the maximum setting is 60 minutes. It is defined as the number of minutes the system has not sense any key have been depressed and should enter the Post Filtration Cycle:

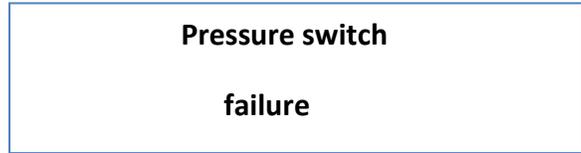
Manual Mode	
User Time Out	<# minutes>

5.0 SPA OPERATION

Once the Regency controller is installed, the spa should have the following modes of operation:

5.0.1 Normal Operation

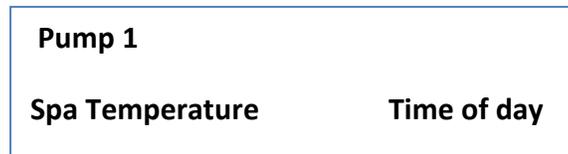
The Regency Spa system is very easy to operate. Upon powering up the system will set the Spa according to the factory default values, if the pressure switch is not installed the unit will display:



After the pressure switch is installed or replaced, the system it will enter a filtering cycle and will start heating up the water until the set temperature is achieved, then it will display the following display:



While using the Spa a depression of any of Spa control key will command the system to display the depressed key, when it is released it will return to the default display. Example; if the Pump 1 is depressed the system will display:



After few seconds it will return to the default display.

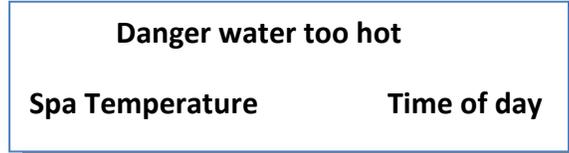
It is recommended to depress the DONE key after the Spa is used, however if this is not done, the system is able to detect that it has not been used for a programmed period of time. When either condition occurs the system will enter the filtering cycle mode and display:



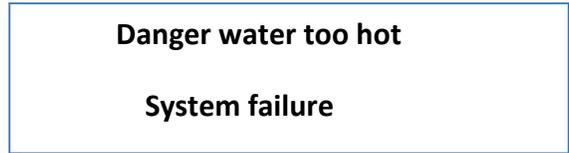
A depression of any key will exit this mode and return the system to the normal mode until the above condition happens again. Then after the filtering cycle is done the system will return to the default display.

5.0.2 Overheat Operation

When the water temperature is sensed to be high than 112°F (44°C), the heater will be TURNED OFF, while keeping the Low Pump running. The system will indicate this condition by displaying:



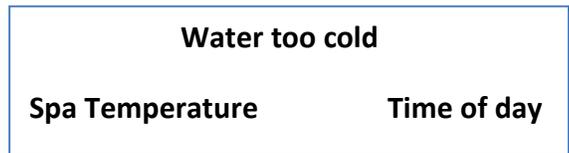
If the temperature keep on raising the system will display the following screen:



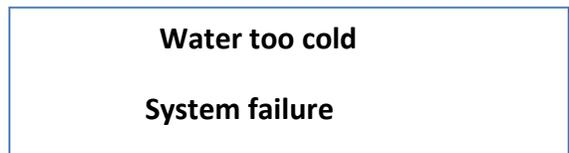
Please remove power from the unit and call a certified technician.

5.0.3 Freeze Protection Operation

When the water temperature is sensed to be below 45°F (7°C) the low speed pump and the heater will be TURNED ON, the system will blink the following display:

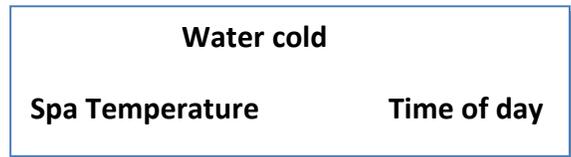


If the temperature does not on raises, the low speed pump will stay ON; the system will display the following screen:



Please remove water from the spa, power from the unit and call a certified technician.

However if the temperature raises and reaches 50°C (10°C) the system will blink the following display:



6.0 SYSTEM SPECIFICATIONS

6.0.1 Relays

ABSOLUTE MAXIMUM RATING

Ambient Temperature 25°C.

Pump Relays	30 Amps @ 240Vac
Blower Relays	30 Amps @ 240Vac
Heater Relay	30 Amps @ 240Vac
Auxiliary I Relay	30 Amps @ 240Vac
Auxiliary II Relay	30 Amps @ 240Vac
Light Relay	10 Amps @ 240Vac
Ozone Generator Relay	10 Amps @ 240Vac

6.0.2 Electrical Outputs

ABSOLUTE MAXIMUM RATING

Ambient Temperature 25°C.

Pump (HI)	14 Amps @ 120Vac	12 Amps @ 240Vac
Pump (LOW)	10 Amps @ 120Vac	8 Amps @ 240Vac
Heater	2 KW @120Vac	4 KW @ 240Vac
Auxiliary I	4 Amps @ 120Vac	4 Amps @ 120Vac
Auxiliary II	4 Amps @ 120Vac	4 Amps @ 120Vac
Light	1 Amps @ 12Vac	
Ozone Generator	3 Amps @ 120Vac	2 Amps @ 240 Vac

NOTE

The total current output of all devices MUST never exceed the input rating.

Higher heater wattage could be used as long as the total combined does not exceed the rated input supply.

6.0.3 Temperature

Temperature Indicating Range	30°F to 120°F (1°C to 50°C)
Temperature Setting Range	60°F to 104°F (15°C to 40°C)
Factory Set	100°F (38°C)
Temperature Accuracy	+/- 2°F (+/- 1°C)
Overheat Temperature	112°F (44.5°C)
Freeze Temperature	45°F (7°C)
Working Temperature	-20°F to 85°F

7.0 INSTALLATION INSTRUCTIONS

7.0.1 Control Panel

Locate a flat area around the rim of the Spa and cut a hole using the cut out template furnished with the system. Make sure a location is select that allows the control panel to reach the system controller. **Do not continue installing the control panel until the system controller is wired and installed in the Spa.**

Then clean the cut out with a 50/50 mixture of isopropyl alcohol around the area so that all the dust and contaminant are removed, remove the paper backing feed the cable through the hole and place the bezel over the hole pressing it firmly and evenly, then connect the provided cable to the system controller housing.

7.0.2 System Controller

Choose a sturdy location close to the heater in order to minimize the wire length between them; the system controller is shipped wired to customer requirements.

The controller's cover is removed by disconnecting the two screws holding the front cover, and then the Spa equipment should be connected according to the provided schematic.

7.0.2.1 Flow Sensor/ Pressure Switch

The heater will not be activated unless the flow sensor/Pressure switch is connected and water flow is detected.

If not already installed in the Spa, install a new sensor as follows:

- Screw the new sensor into the threaded port in the heater
- Do not over-tightening the sensor, it could strip the threads or crack the heater housing.
- Connect the wires as indicated in the provided schematic.

7.0.2.2 Thermowell

The thermowell should be located 10" bellow the normal water level of the spa.

7.0.2.3 Temperature Sensor

The temperature sensor is the sensor with the larger diameter stainless steel probe and longer cable. The Spa temperature sensor is to be installed in a thermowell.

7.0.2.4 Freeze Sensor

The freeze sensor is the sensor with the smaller diameter .250" diameter stainless steel probe and shorter cable.

Install it following the following procedure:

- Insert the sensor into the groove located on the heater tube under the clip.
- Make sure that the sensor is covered by the foam gasket under the clip.
- Connect the sensor to the printed circuit board at the position indicated in the schematic.

7.0.2.5 Heater

The Black and White heater wires should be connected to the board terminal and the Green wire to the grounding plate.

8.0 CONTACT INFORMATION

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