ReefKeeper
ELITE

ReefKeeper Elite

User Guide

Digital Aquatics

Information in this document is subject to change without notice. Digital Aquatics reserves the right to change or improve its products and to make changes in the content without obligation to notify any person or organization of such changes. Visit the Digital Aquatics website (www.DigitalAquatics.com) for current updates and supplemental information concerning the use and operation of this and other Digital Aquatics products.

7/2/2008 - 34-0011-001 - Rev B

Table of Contents

Important Information VI
1. Introduction 1
1.1 About this Guide 1
2. Product Overview 2
2.1 Included Hardware 2
3. Getting to Know the ReefKeeper Elite System 3
3.1 Care and Maintenance 3
3.2 Installation and Setup 3
3.2.1 Startup 3
3.2.2 Connecting Modules 3
3.2.3 Mounting 4
3.3 Updating Firmware and the System Interface Device 4
3.4 How to Navigate the System Guide 4
3.4.1 Directions and Instructions 4
3.4.2 Understanding the Interface 6
3.4.3 General Notes 8
4. [Menu] 9
4.1 The Home Screen 9
4.1.1 Home Data 9
4.1.2 Quick Data 10
4.1.3 Icons 10
4.2 Settings 11
4.2.1 General "Gen" 11
4.2.2 System "Sys" 13
4.2.3 Display "Disp" 15
4.2.4 Timers (1 – 63) "Timr" 16
4.2.5 Alarms (1 – 63) "Alrm" 17
5. [Inputs] 20
5.1 Input Screen 20
5.2 Input Options 21
5.2.1 Calibrate 21
5.2.2 Enable Graph 22

5.2.3 Show Graph 23
6. [Outputs] 24
6.1 Outputs Screen 24
6.2 Output Options 25
6.2.1 Channel Mode 26
6.2.2 New Function 26
6.2.3 Edit Function 26
6.2.4 Enable Graph 26
6.2.5 Show Graph 27
6.3 Setting up a Channel 27
6.3.1 Pump 28
6.3.2 Controller 29
6.3.3 Multi-Timer 30
6.3.4 Light 31
6.3.5 Adv. Light (Advanced Light) 31
6.3.6 Lunar 32
7. Data Logging and Graphing 33
8. Modules 34
9. Troubleshooting 35
A. Appendix A 36
B. Appendix B 37

Important Information

Icon Definitions

A exclamation point within an equilateral triangle is intended to alert the user of a cautionary notice to which attention should be given prior to the products usage.

A lowercase "i" within a circle is intended to alert the user to the presence of important operating information in the literature accompanying the product.

A jagged arrow within an equilateral triangle is intended to alert the user of a possible hazardous warning that involves the possibility of electrical shock.

Disclaimers

- As with most electronic devices, contact with water will cause unrepairable damage and is not covered under any warranty.
- The ReefKeeper Elite carries a limited 1 year warranty.
- All probes sold by Digital Aquatics have a limited 90 day warranty unless otherwise stated. Some probes may be covered by the manufacture and not Digital Aquatics.

Commonly used abbreviations

Abbreviation	Definition
RKE	ReefKeeper Elite
PC4	Power Controller 4
SL1	Sensor Lab 1
MLC	Moon Light Controller
SID	System Interface Device

1 Introduction

Thank you for purchasing the Digital Aquatics ReefKeeper Elite aquarium control system. Digital Aquatics recommends that you read the entire manual before using or installing this device.

Please e-mail any questions you may have to support@digitalaquatics.com.

1.1 About this Guide

This guide should serve as a reference for the Digital Aquatics ReefKeeper Elite system. It outlines the system layout, interface, menu system, programming and more. If after reading this guide there are still questions, please visit our website or email support@digitalaquatics.com

2 Product Overview

The ReefKeeper Elite is one of the most expandable aquarium controllers on the market today. With the ability to monitor and control up to 63 modules the configurations are almost endless.

2.1 Included Hardware

Included Head Unit
1 x ReefKeeper Elite Head Unit

Included Modules
1 x RKM-SL1
2 x RKM-PC4
1 x RKM-SID (System Interface Device)

Included Accessories
1 x pH probe kit
1 x Temperature Probe
2 x Switch Input Adapters
1 x 6' Bus Cable
2 x 3' Bus Cable
2 x 1' Bus Cable
1 x 6' USB cable
8 x Mounting screws

A complete list of the included hardware and their part numbers can be found in Appendix B.

3 Getting to Know the ReefKeeper Elite System

3.1 Care and Maintenance

The ReefKeeper Elite, as a system, is relatively maintenance free. Do not use water to clean any part of the unit. Simply wiping down the surfaces of the modules should be all that's needed.

If it's found that there is excessive salt build up or water splashing, the module affected should be relocated. Not addressing this type of issue can result in a failure of that module and is not covered under warranty.

Use a soft cloth such as that for eyeglasses to clean the face of the head unit to avoid scratches.

3.2 Installation and Setup

3.2.1 Startup

When starting up the ReefKeeper Elite, make sure to not touch the key pad. The key pad must remain untouched during boot so it can calibrate correctly.

3.2.2 Connecting Modules

While most customers may never approach 252 outlets or 63 pH probes, many will put together systems beyond a basic setup. When adding modules to an RKE system, there are a number of things to take into consideration.

Limitations of the ReefKeeper Elite

- 63 total modules (of any type)
- 50' total bus cable length. Some systems may be affected by electrical noise or environmental interference.

Modules for the ReefKeeper Elite system are plug and play and do not require the user to manually reconfigure the system like with other controllers. Also because of the type of bus we use, modules can be hooked up in any order that a system requires within the stated limitations.

3.2.3 Mounting

Mounting the RKE can be done in several different ways depending on the needs and likes of the customer.

ReefKeeper Elite head unit

There are several convenient options for mounting the head unit in your system.

1. Side tabs with screws.
2. Slots on the back panel allow the head unit to mout by sliding it down over two screws.
3. Flush mounting. The head unit will fit nicely in a cabinet, wall or through any panel. The side tabs on the head unit can be attached to the back side of the surface securing it to the panel providing a clean, professional looking installation.

Two screws have been included with the system.

Modules

Modules have been designed with convenient mounting tabs and include two mounting screws. As with all electronic devices it is important to make sure to mount them as high as you can away from water. Use drip loops for device and probe cords to prevent water from being introduced to sensitive electronics. Take care to secure loose wires up out of the way to avoid potential hazards.

Make sure to review each module's manual for any special instructions that must be followed.

3.3 Updating Firmware and the System Interface Device

See the RKM-SID Manual for this information.

3.4 How to Navigate the System Guide

3.4.1 Directions and Instructions

This user guide has been written with every attempt to make the information and instructions as easy to understand as possible. This section will explain some of the syntaxes and conventions used to do this.

Square brackets([ ]) with a word or symbol inside indicate a key. The RKE has 11 keys as follows:

[Menu]
[Inputs]
[Outputs]
[Up] = [up arrow]
[Down] = [Down arrow]
[Left] = [left arrow]
[Right] = [right arrow]
[Enter]
[Back]
[FN] = Function
[Standby]

Whenever an instruction calls for a key touch the required key will be indicated as above.

Quotations(" ") are used when the exact word, phrase or abbreviation is being used that the user will see on the screen.

Words such as up, down, left and right will also be used without the square brackets when simple directional instructions are being given. It is implied that the user will need to use the [Up], [Down], [Left] and [Right] keys to make those moves.

Because of the new capsense interface, the word "press" is not used. A simple "touch" is all that's needed to activate a key.

Example Instruction: Touch [Menu] and scroll down to "Disp", touch [Enter] to access the display menu.

Saving

In most menus there is a "Save" selection at the bottom of the screen. All settings must be saved to retain the changes and make them permanent.

Also note that when navigating a menu the user can touch [FN] to quickly jump to the save option. Touch [Enter] and the changes will be stored.

When a bold **Save** is displayed in this guide it indicates that a save is required as stated above.

3.4.2 Understanding the Interface

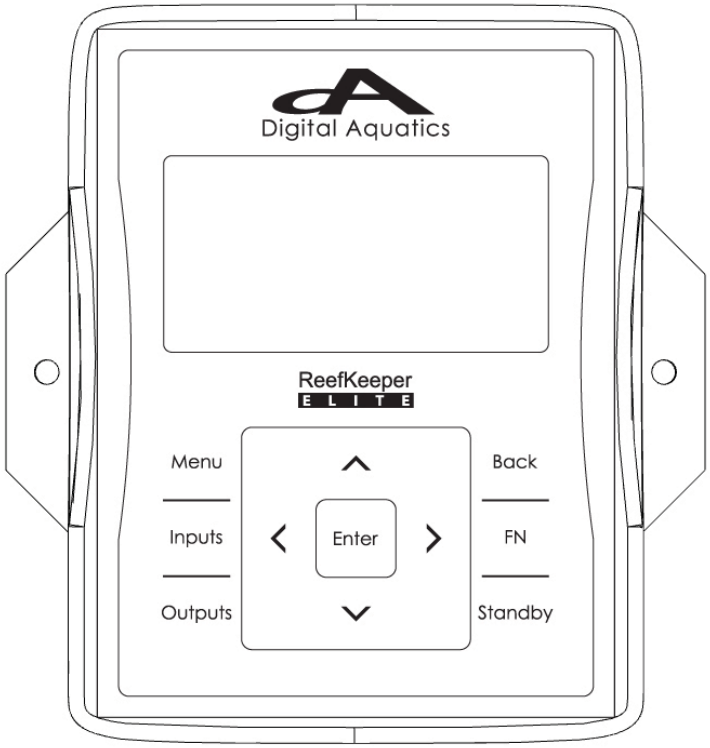

Figure 3a: *Front of the ReefKeeper Elite Head unit*

11 Key Interface
The Digital Aquatics ReefKeeper Elite uses an entirely new type of interface called capsense. Because this is not a traditional button style input, it does not have the tactile feedback that may be expected. However after just a minute of use it becomes quite intuitive.

This new interface greatly reduces the potential for failure that comes with older mechanical methods.

The RKE also has grown from the traditional three button interface that most controllers on the market use to a new 11 key interface. This gives the user a more direct overall experience that allows for faster, easier navigation.

Menu
Touching the [Menu] key enters into the menu system where the user is able to manipulate most of the settings of the ReefKeeper Elite system.

Inputs
Touching the [Inputs] key enters into the Inputs Menu where the user is able to see and configure the input devices and probes that are currently connected to the ReefKeeper Elite system.

Outputs
Touching the [Outputs] key enters into the Outputs Menu where the user is able to see and configure the output channels/devices that are currently connected to the ReefKeeper Elite system.

Arrow Pad
The Arrow Pad is used for navigating through the system, changing views and manipulating settings.

Enter
The [Enter] key allows the user to confirm a selection when making changes.

Back
[Back] allows the user to back out of a selection without saving the changes. The [Back] key is also used to back out or cancel certain actions such as Standby.

FN
The [FN] or function key is a dynamic key that allows for any number of functions to be assigned depending on what screen the user is on.

[FN] Hot key functions:
1) While in a settings screen touching [FN] will jump the highlighted selection to "Save". This is quite handy when working in long menus and the user wants to quickly make a single change and save it.
2) When a device is highlighted touch [FN] to quickly view it's graph. If the selected item is not currently being graphed a message will appear.

Standby
While on the Home Screen, [Standby] functions as quick access to either of the two standby modes. The user can toggle between Standby 1 or 2 and then touch [Enter] to select one. Before or after a standby mode has been invoked touching the [Back] button will cancel the standby action and return the user to the home screen.

The [Standby] key is only active on the home screen.

3.4.3 General Notes

The following are general notes for the ReefKeeper Elite controller and intended to apply to numerous entries in this manual.

Device

When the word "Device" is used it refers to any probe, switch, or outlet. This allows a program to use almost any item to control another.

The notation for a Device is in the following format:

##: Name: Value

= Module number
Name = Device name such as "ORP"
Value = Current value of the device

Example
01 : CH1 : 0.00 = Channel 1 on module 1 with a current value of 0.

Figure 3b: *Device display format*

01:CH1:0.00 = Channel 2 on module 1 with a current value of 0

Time out

If the controller is left with no interaction from the user for 3 minutes it will time out and return to the home screen. This function happens on any screen except for calibration.

Scrolling

Holding [Up] or [Down] will continuously scroll through values. While the key is being touched the speed of the scroll will increase as the duration increases. This allows the user to more quickly increment or decrement a value.

4 [Menu]

4.1 The Home Screen

The Home Screen is the primary screen that a user will see. It is the screen that all other screens time out to after a period of inactivity. This screen is designed to give the user access to the most important system data.

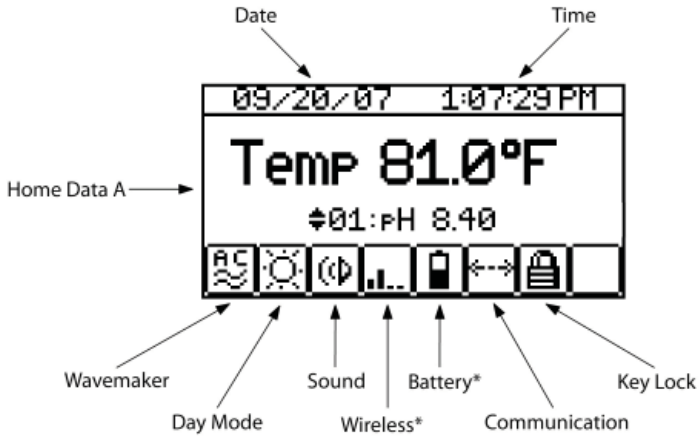

Figure 4a: *The Home Screen*

* The modules that utilized these features have not yet been released.

The date and time are displayed across the top of the home screen. There are two types of home screen that the user can select from. See "Gen" settings for more information.

4.1.1 Home Data

Home Data is the large sized font on the home screen that displays the current value of the selected probe. The Home Data is user selectable in the System settings and can display any port that the user selects.

In the alternate version of the home screen the user can select up to four devices to be displayed at all times.

4.1.2 Quick Data

Quick Data is the smaller sized font on the home screen just below the Home Data. By touching [Up] or [Down] the user can quickly scroll through all available ports and their data.

4.1.3 Icons

The Home Screen has eight icons along the bottom of the page. These icons are intended to give the user feedback on a variety of system parameters.

Wavemaker icon
Shows the current wavemaker mode of the system.

Day Mode icon
Shows the current state of the time system; day mode displays a sun and night mode displays an animated moon (pausing at the current lunar phase.)

Sound icon
Displays the current audible setting.

Wireless icon
Displays the current strength of the wireless connectivity. (Intended for the future wireless module.)

Battery icon
Displays the status of the backup battery. (Intended for the future battery back up module.)

Communication icon
Shows network activity.

Key Lock icon
Displays the current status of the key lock.

4.2 Settings

To enter into the setting menu, touch the [Menu] key. A list will appear on the left side of the screen with the menu options below. Use the [Up] and [Down] arrows to scroll through the selections, touch [Enter] when the menu item is highlighted.
During general navigation the [Right] and [Left] button can be used to quickly navigate through menus and selections in the same way as [Enter] and [Back].

4.2.1 General "Gen"

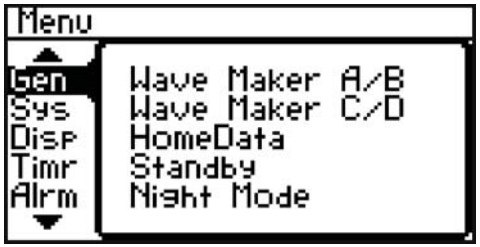

Figure 4b: *The General menu*

Wave Maker A/B and C/D
This defines the wavemaker paired timers that set the opposing time period of an oscillation. This is used in conjunction with power heads in a tank to create turbulent flow that simulates the natural environment caused by wave action.

Setting wavemaker A's duration and then B's duration will set up a complimentary relationship between the two cycles. Such that A is on when B is off and B is on when A is off.

They do not have to be of equal lengths; this allows the user to create a custom cycle.

The range for a wavemaker is from 11:59:00 to 00:00:01.

To have seconds resolution hours can not be set and if you want hour+ durations, seconds can not be set. Either selection will go to 00 if the other is altered as shown below.

Item	Description	Options
W.M. A	Wavemaker A Duration	HH:MM:00 or 00:MM:SS
W.M. B	Wavemaker B Duration	HH:MM:00 or 00:MM:SS

Item	Description	Options
W.M. C	Wavemaker C Duration	HH:MM:00 or 00:MM:SS
W.M. D	Wavemaker D Duration	HH:MM:00 or 00:MM:SS

HomeData
HomeData can be set to any channel, probe, or input, and will be displayed in large text on the home screen. While in HomeData type A the quick data is not settable but is meant to be quickly scrolled through with the [Up] and [Down] keys.

Item	Description	Options
HomeData Type	A: The default screen setting, HomeData Type A, has the large home data and the smaller quick data. B: If HomeData Type B is selected the user can select up to four probes, channels, or inputs to view on the home screen at one time. Note there is no quick data if this option is selected.	A/B
A/B1	Select this option for use in both HomeData Type A and B.	All inputs and outputs
B2	Select this option for use with HomeData Type B	All inputs and outputs
B3	Select this option for use with HomeData Type B	All inputs and outputs
B4	Select this option for use with HomeData Type B	All inputs and outputs

Standby
Standby is a user settable mode that will stall/halt channels as defined by the user to perform feedings, maintenance or any other tasks as needed.

Standby can be set from 00:01 to 59:59.

Item	Description	Options
SB 1	Standby 1 Duration	MM:SS
SB 2	Standby 2 Duration	MM:SS

Night Mode
Night Mode is a special timer that allows the user to establish a global time period that effects all devices associated with it such as pumps, moonlights, and other devices the user would like to have special attributes at night.

Item	Description	Options
On	Night Mode Start time	HH:MM
Off	Night Mode Stop time	HH:MM

Night mode is typically set such that it's "on" or starts sometime in the evening and is "off" or stops sometime in the morning.

4.2.2 System "Sys"

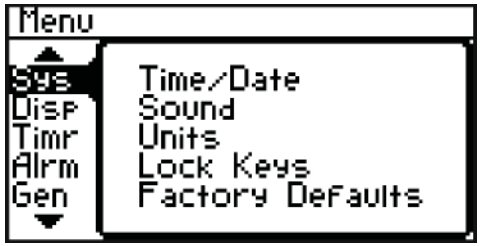

Figure 4c: *The System menu*

Time/Date
This section is where the systems time and date are set. There is also a selection for 12 or 24 hour clock modes.

Item	Description	Options
Time	Touch [Left] and [Right] to highlight a field and the use [Up] and [Down] to change a value.	HH:MM:SS
Clock	The "Clock" option allows the user to set either 12 or 24 hour clock modes for the system clock.	12 / 24
Date	Touch [Left] and [Right] to highlight a field and then use [Up] and [Down] to change a value.	MM/DD/YY

Sound
Here the user can turn off the sounds associated with key presses.
Sound: ON / OFF

Item	Description	Options
Sound	This option only applies to the keypad sound.	ON / OFF

Units
This section is where the selection can be made for unit options. The RKE Elite can display units in either Fahrenheit or Celsius.

Item	Description	Options
Temp	Temperature Type	° C / ° F

This is also where future unit selections will be as they become available.

Lock Keys
The key pad of the RKE can be locked to help prevent unwanted access to the system. Enter the Lock Keys menu in the Sys settings and select "On". Once locked the RKE will exit to the Home Screen and the unlock code must be entered to release the lock.

Item	Description	Options
Lock	Key Lock Toggle	ON / OFF

The unlock code: [Up], [Down], [Left], [Down]

Factory Defaults
Resetting defaults will not reset the time and date of the system or affect modules attached to the system.

Item	Description	Options
Reset	Selecting "YES" will completely reset all settings, programs and logs. This should only be used as last resort in the event the ReefKeeper Elite settings are unusable.	ON / OFF

Info
Displays the current firmware revision. Touching [Enter] with "Version" selected will update and display the current value.

4.2.3 Display "Disp"

The Display menu is where the user can take advantage of all the display options of the RKE. Here is where color, contrast, screen brightness and inversion can all be set.

Figure 4d: *The Display menu*

Color
There are 30 color options for the backlight of the display. Depending on the look of the tank, fish room or just personal preference the RKE can be customized to the individual user.

Item	Description	Options
Color	Backlight Color	00 - 29

Contrast
The screen appearance can vary depending on mounting or viewing angle. Adjusting the contrast of the display can maximize the viewing experience.

Item	Description	Options
Contrast	Display Contrast	00 - 31

Brightness
Brightness is a setting that's dependant on time of day. The display can be set to be on different brightness levels while in day mode and in night mode. The level will automatically change when the system transitions from day to night and back again.

Item	Description	Options
Day	Brightness when not in Night Mode	00 - 10
Night	Brightness when in Night Mode	00 - 10

Invert Screen
Another personal preference that some users may have is to invert the screen.

Item	Description	Options
Invert	Invert Display	ON / OFF

4.2.4 Timers (1 – 63) "Timr"
There are 63 timers that can be set up by the user. Timers are used in conjunction with certain programming options like the Multi-Timer and the Adv. Light function.

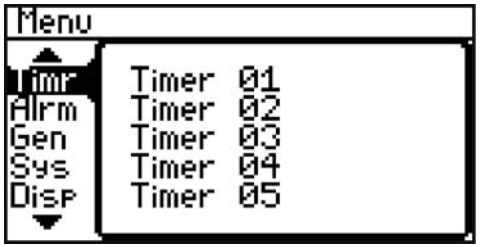

Figure 4e: *The Timers menu*

All the timers have the same layout and options.

Item	Description	Options
DoW	Stands for "Day of Week". This allows the user to select the day(s) of week that the timer will be active. Highlight the DoW menu and touch [Enter], the user will then be prompted to select what days the timer will be active.	ON / OFF for each day of the week.

Item	Description	Options
Start At	This is the time for any of the selected days that the timer will start. Note: This time is applied to each day that's been selected for this one timer.	HH:MM
Time ON	Here is where the ON duration is set for the timer event. The range for an ON time is from 11:59:00 to 00:00:01. See note below	HH:MM:00 or 00:MM:SS
Time OFF	Here is where the OFF duration is set for the timer event. The range for an OFF time is from 11:59:00 to 00:00:01. See note below	HH:MM:00 or 00:MM:SS
Repeat	The number of times a timer is repeated in a single day can be set to 0 (meaning it will happen once) to 62 times in a single day. NOTE: If a timer is set to repeat any number of times that will push the event past the next start time for that timer, it will skip passed that START point and miss the cycle for that occurrence.	0 - 62
Oscillate	If Oscillation is set to "Yes" the start time and repeat will be ignored and the cycle will continue indefinitely.	YES / NO

To have seconds resolution hours can not be set and if you want hour+ durations, seconds can not be set. Either selection will go to 00 if the other is altered as shown below.

4.2.5 Alarms (1 – 63) "Alrm"
There are 63 Alarms that can be set and used to initiate a change or an alert. All alarms can be triggered by one of three criteria as listed below. While up to three criteria can be set, only one is needed. An alarm does not need to be associated with a function to be useful. They can be use strictly as an audible/visual alert to a set condition.

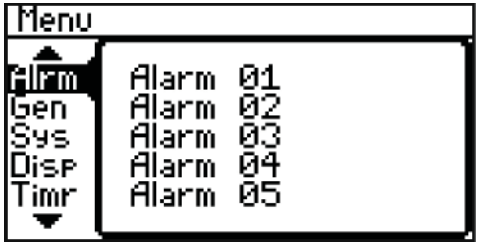

Figure 4f: *The Alarms menu*

To set up an Alarm, scroll to the desired alarm and touch [Enter]. Then scroll through the options setting up all the parameters as desired.

Once an alarm is set up it can be attached to any number of control functions. A single alarm can be used as many times as desired.

Example
If Alarm #12 is triggered by a low water level and all the pumps in a system are to shut off when alarm #12 is triggered, that one alarm can be associated with any and all control functions where it's needed.

Figure 4g: *Example of Alarm usage*

With the ability to combine up to three criteria per alarm, this feature becomes extremely powerful and versatile.

Device 1, Device 2 and Device 3

Item	Description	Options
Device	The Device selection allows any item in the system to be selected allowing it to trigger a change in state.	All inputs and outputs
Value	Indicates the value at which the trigger occurs.	Specific to each device
Trip	This selection indicates if the alarm is to trip above or below the set point. Such that an alarm should trip if Temp drops below 75 degrees; or above 75 degrees.	Above Below

Mode
Mode determines how the system will inform the user when the alarm is tripped. None of the modes affect how an alarm is associated with a function and is strictly meant for notification.

Item	Description	Options
Mode	Alarm Mode	None Flash & Beep Beep Flash

5 [Inputs]

This section contains information on how to access and configure inputs with the ReefKeeper Elite system. An Input is typically a probe or device that monitors a parameter in your system like temperature, pH, and ORP. However, any item can be used as an input. Because of the modular style of the ReefKeeper Elite, this list will grow as time goes on.

5.1 Input Screen

To access the Input Screen, touch the [Inputs] key.

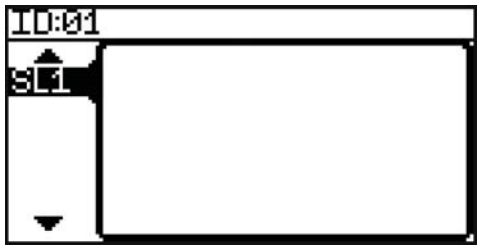

Figure 5a: *The Input Screen*

Figure 5a above is composed of two windows. The left window shows any module in the system that has an input. Once a module is selected, the right window shows its inputs and the current values for those inputs.

A label that is only a number, i.e. 03, is a module that has been disconnected from the system. Once reattached, the module's name will replace this number.

While cycling through the connected modules the selected modules status LED will flash. This will assist in identifying the selected module.

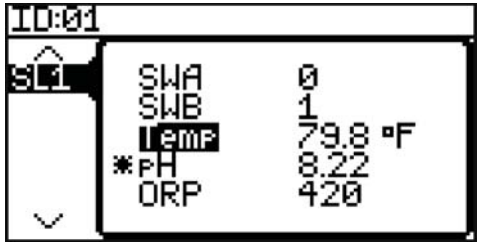

Figure 5b: *Displays the available inputs for the selected device*

5.2 Input Options

To access the Input options navigate with the arrow keys to the input of interest once a module has been selected. Touch the [Enter] key to view the input menu options for that item. This menu is used to calibrate and setup/view the graph for the selected input.

The right window will display a list of options.

Figure 5c: *The Input options*

5.2.1 Calibrate

If calibration is not possible for the selected device this option will not be available.

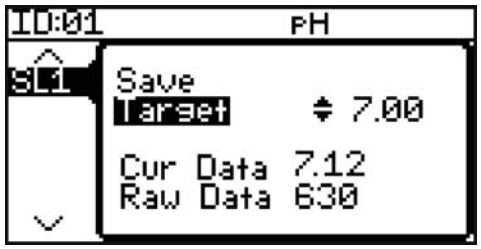

Figure 5d: *Example calibration screen*

The Input calibration menu is used to calibrate or recalibrate inputs. Whenever a new probe is added it should be calibrated before being used.

Calibration Steps

1. To Calibrate, highlight "Calibrate Probe" and touch [Enter]. The right window will change to the calibration screen, see figure 5d.
2. Highlight "Target" if an adjustment to the pre-set value is desired and touch [Enter]. Adjust the value to the desired target and touch [Enter].
3. Scroll back up to either "Save" or "Next" and allow the raw data to stabilize and then touch [Enter].

Calibration should not be saved until the value shown as "Raw Data" has stabilized. Saving before stabilization can result in an inaccurate calibration.

If a probe has more than one calibration point, the first save option will say "Next" as indicated above. Selecting "Next" will save the current value and then go to the next calibration point. Repeat steps 2 and 3 for all additional calibration points.

4. Once "Save" is an option at the top of the screen touch [Enter] to save calibration and the probe is now calibrated.

Touching [Back] will cancel any changes made during calibration. If the probe has more than one calibration point, touching [Back] will go back to the previous calibration point.

5.2.2 Enable Graph

With "Graph" highlighted, touch [Enter]. Toggle between "Yes"/"No" to either enable or disable graphing for this input. Highlight "Save" and touch [Enter].

If "No" is selected and saved, all graphed history from that device is lost.

5.2.3 Show Graph

Selecting "Show Graph" and touching [Enter] will show the current graphed history of the selected input.

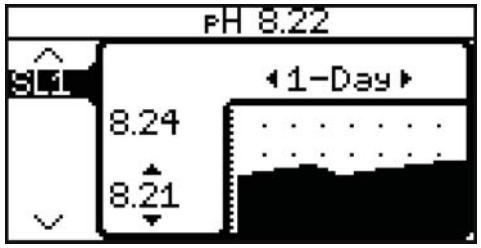

Figure 5e: *Example graph of pH set to a range of 1-Day*

6 [Outputs]

This section contains information on how to access and configure outputs with the ReefKeeper Elite system. An Output is also called a channel and typically will be associated with an outlet that will control a device that is plugged into it.

6.1 Outputs Screen

To access the Output screen, touch the [Outputs] key from the Home Screen

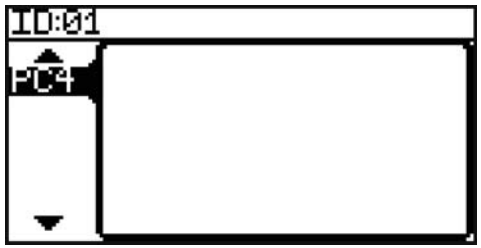

Figure 6a: *The Outputs Screen*

The left window shows any module in the system that has an output. The right window shows a module's output once that module is selected.

The label that is only a number, i.e. 03, is a module that has been disconnected from the system. Once reattached, the module's name will replace this number.

While cycling through the connected modules the selected modules status LED will flash. This will assist in identifying the selected module.

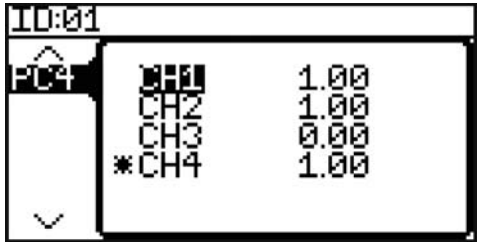

Figure 6b: *The available outputs for the selected device*

In Figure 6b an output device has been selected. The right window now shows a list of outputs associated with the current module and their current values.

6.2 Output Options

To access the Output options navigate with the arrow keys to the output of interest once a module has been selected. Touch the [Enter] key to view the output menu options for that item. This menu is used to configure, program, edit and graph the selected output.

The right window will display a list of options.

Figure 6c: *The Output options*

6.2.1 Channel Mode

There are three "modes" that a channel can be set to, Auto, On and Off. When any mode is selected other then Auto, the original function/program for that channel is not lost; it is ignored and the override state is set.

Item	Description	Options
Mode	**AUTO:** Setting a channel to "Auto" puts the channel under the control of the function assigned to it. **ON:** Setting a channel to "On" will override that channels function to an on state and it will not follow the program. **OFF:** Setting a channel to "Off" will override that channel to an off state and it will not follow the program.	AUTO ON OFF

6.2.2 New Function

New Function allows the user to assign a new function to a channel. If the new function is not saved the channel will retain its old function.

New function must be used the first time a function is programmed. It must also be used if the user is changing the type of function that's assigned to that channel.

6.2.3 Edit Function

Edit Function allows the user to edit the function that is currently assigned to that channel. If the type of function assigned to the channel is being changed the user must use the NEW function option.

6.2.4 Enable Graph

With "Graph" highlighted touch [Enter]. Toggle between "YES"/"NO" to either enable or disable graphing for this input. Highlight "Save" and touch [Enter].

If "No" is selected and saved all graphed history from that device is lost and can not be retrieved.

6.2.5 Show Graph

Selecting "Show Graph" and touching [Enter] will show the current graphed history of the selected input.

6.3 Setting up a Channel

The following is a list of options for programming an output. When dealing with timers and alarms be sure to reference section 4.2.4 and 4.2.5 if needed.

Each Function has unique features that differentiate it from the others. While functions have names such as pump or light, their program can be used however the user would like and for any device where a particular operation or feature is desired. The function names are intended to help assist the user in quickly setting up there ReefKeeper Elite system.

Function options

- Pump
- Controller
- Multi-Timer
- Light
- Advanced Light
- Lunar

Setting up a channel using the key pad is intended to be as straight forward as possible. The user can navigate through the options by using the [Up], [Down], [Left], and [Right] keys. To complete an entry, touch the [Enter] key once the desired selection or modification is made. As with most options the "Save" option must be selected once setup is complete. Failure to save the settings and backing out of the menu will result in the loss of all changes or settings made.

6.3.1 Pump

The Pump function allows the RKE to control a pump given certain inputs as selected by the user. Pumps can be set with several options all of which can be affected by entering a standby mode or the triggering of an alarm.

Pump can also have a post standby delay. This delay will postpone the change in the state of the pump when your system is taken out of standby or an alarm is no longer active. If a pump is set to turn off in one of the mentioned states, the delay will hold it for that duration beyond the triggering event. This can be extremely useful when coming out of a standby mode used for feeding. A user can set the skimmer to come on after a delay so not to over skim food from the system.

Item	Description	Options
Pump	Active during wavemaker A	W.M. A
	Active during wavemaker B	W.M. B
	Active during wavemaker C	W.M. C
	Active during wavemaker D	W.M. D
	Sump/Skim: This option is active all the time however standbys and alarms can be associated with it to pause or delay its activity.	Sump/Skim

Within Pump there are several options or types to select from. A pump can be set to any of the following "types":

Item	Description	Options
Night	A pump can be set to turn off in Night Mode. This allows for the system to simulate the calmer water in the evening hours.	ON/OFF
Delay	Defines the time delay after the function is triggered.	HH:MM:00 or 00:MM:SS
Standby	Select whether this function should be affected by Standby.	SB1, SB2, SB1&2, None
If SB	Operation to occur based on the standby option selected.	ON/OFF
Alarm	Select whether this function should be affected by an alarm.	None, Alarm 1 - 63

Item	Description	Options
If Alarm	Operation to occur based on the alarm selected.	ON/OFF

6.3.2 Controller

The Controller function will change the state of an output based on the current state of an input device. The user can select any of the available input or output devices such as a pH probe, temperature probe, or channel as an input device.

Examples of a few devices that can be controlled by the Controller function are the following.

- Heaters
- Chillers
- Fans
- Dosing pumps
- Auto top off (ATO) pumps
- Calc reactors

Item	Description	Options
Device	The Device selection allows any item in the system to be selected as the trigger for the output state.	All inputs and outputs
Target	The target value will depend on the probe selected. If a temperature probe is selected the user will select a temperature.	Specific to each device
Hysteresis	The hysteresis of the function, as used by the ReefKeeper Elite, is a set window, equally divided above and below the set point. The user sets the value of the hysteresis as so.	Specific to each device
ON when	This sets the condition for when the channel should power the device plugged into it. A heater for example would be set to come on "below" whereas a chiller or fan would be set to come on "above".	High / Low
Standby	Select whether this function should be affected by Standby.	SB1, SB2, SB1&2, None

Item	Description	Options
If SB	Operation to occur based on the standby option selected.	ON/OFF
Alarm	Select whether this function should be affected by an alarm.	None, Alarm 1 - 63
If Alarm	Operation to occur based on the alarm selected.	ON/OFF

Example
Assuming temperature with a set point or target of 78.5 degrees is set. The user then sets a hysteresis of 0.2 degrees. The function will then activate the channel as needed to hold the temperature between 78.6 and 78.4.

Figure 6d: *Example of Hysteresis*

Depending on if the channel is "on" when high or low, we'll assume "on" when low for this example similar to how a heater is set up. The channel will come on when the temperature drops below the target less ½ the hysteresis. That's 78.4 degrees based on the above settings. However the channel will NOT turn off until the temperature crosses above the target plus ½ the hysteresis, 78.6 degrees.

6.3.3 Multi-Timer

The Multi-Timer allows the user to combine up to four timers to create a custom function.

Item	Description	Options
Timer	First timer	Timer 1 - 63 None
Timer	Second timer	Timer 1 - 63 None
Timer	Third timer	Timer 1 - 63 None
Timer	Fourth timer	Timer 1 - 63 None
Standby	Select whether this function should be affected by Standby.	SB1, SB2, SB1&2, None
If SB	Operation to occur based on the standby option selected.	ON/OFF
Alarm	Select whether this function should be affected by an alarm.	None, Alarm 1 - 63

Item	Description	Options
If Alarm	Operation to occur based on the alarm selected.	ON/OFF

6.3.4 Light

The light program allows the user to control different kinds of lighting with certain parameters that are unique to that lighting such as sure-on.

Sure-on is automatically active if Metal Halide (MH) is selected as the light type. This feature will delay the power up of a MH in the event of a power outage or other power interruption for 15 minutes to give the bulb time to cool down so that it can relight.

Item	Description	Options
Light	Light Type	MH / Other
Time ON	Time when this light is to turn on.	HH:MM
Time OFF	Time when this light is to turn off.	HH:MM
Standby	Select whether this function should be affected by Standby.	SB1, SB2, SB1&2, None
If SB	Operation to occur based on the standby option selected.	ON/OFF
Alarm	Select whether this function should be affected by an alarm.	None, Alarm 1 - 63
If Alarm	Operation to occur based on the alarm selected.	ON/OFF

6.3.5 Adv. Light (Advanced Light)

The Advanced Light Function can be used to program the MLC (Moon Light Controller,) or the ALC (Advanced Light Controller.) Either module has the ability to control certain types of lighting fixtures such as Aqua Illuminations LED lighting arrays, dimmable T5 ballast and our own Lunar Pods. See the manuals for the listed modules for more information.

The information and features in this section are subject to updates and modifications as the development process continues.

Item	Description	Options
Lunar	Toggle lunar control	YES / NO

Item	Description	Options
Dim Style	Specifies the type of fade-in and fade-out.	A, B, C, None
Intensity	Light Intensity	0-100
Temp K °	Light Temperature in Thousands of Kelvin.	0-29
Standby	Select whether this function should be affected by Standby.	SB1, SB2, SB1&2, None
If SB	Operation to occur based on the standby option selected.	ON/OFF
Alarm	Select whether this function should be affected by an alarm.	None, Alarm 1 - 63
If Alarm	Operation to occur based on the alarm selected.	ON/OFF

6.3.6 Lunar

The Lunar option applies to the MLC and ALC; it makes setting up the Moon Light Controller quick and easy.

The Lunar function will set the output to follow the nightly intensity of the moon.

Just because this function can be selected for any output does not mean that any output will have the capability of the MLC. Only the MLC and ALC can vary the output intensity of a channel.

7 Data Logging and Graphing

The ReefKeeper Elite has been designed to incorporate internal data logging of up to 32 unique devices. Any one data log can contain one weeks worth of data with 10 minute resolution.

Horizontal

By touching [Left] or [Right] the user can adjust the horizontal scale of the graph and view either the entire week or the last day.

Vertical

Touching [Up] or [Down] will change the lower bound changing from 0 to the minimum value in the data log. This works as a zoom allowing the user to view the data with more detail.

8 Modules

RKM-PC4
The PC4, or Power Controller 4 module contains four programmable outlets used to power/control items plugged into it. The module has advanced features such as manual override and IntellaStrip™ technology.

RKM-SL1
This module receives probe/switch inputs including pH, ORP, Temperature, and two switch inputs.

RKM-MLC
The MLC is the Moon Light Controller. This module drives up to six Digital Aquatics moonlight Pods.

RKM-ALC
The ALC stands for Advanced Light Controller. It will give users the ability to control dimmable T5 ballasts with a standard 0-10 volt input. It will also contain the protocol for controlling lighting fixtures via a serial I/O such as the Aqua Illuminations LED light arrays. It will also contain two additional lunar pod ports. This unit is due out in late Q3 of 2008.

RKM-NET
The NET module is the Ethernet based web server module that is due out in Q4 of 2008. Details will be released in detail at a later date.

9 Troubleshooting

There is currently no troubleshooting information in this section.

A Appendix A

Technical Notes

There is currently no information in this section.

B Appendix B

Modules and Accessories

Modules	Ordering Part Number
RKM-PC4	30-0014-000
RKM-SL1	30-0015-000
RKM-MLC	30-0018-000

Accessories	Ordering Part Number
Digital Aquatics Temperature probe	30-0007-001
Digital Aquatics Switch Input Leads	30-0015-000
pH probe Kit	30-0008-000
PinPoint ORP probe Kit	30-0020-000
Bus Cables (different lengths)	See the Digital Aquatics online store
MLC Pod (Pure Lunar White)	30-0019-000
MLC Pod (Nocturnal Blue)	30-0019-001

Digital Aquatics

19825 141st NE, Woodinville WA, 98072

7/2/2008 - 34-0011-001 - Rev B