Digital Aquatics

ReefKeeper Elite V2
Advanced Aquarium Controller

USER GUIDE

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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 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 against manufacturer defect.
- 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

RKE	ReefKeeper Elite System
GC1	ReefKeeper Elite Headunit
PC4	Power Controller 4
PC1	Power Controller 1
SL1	System Lab 1
SL2	System Lab 2
MLC	Moon Light Controller
SID	System Interface Device
ALC	Advanced Light Controller
NET	Network Interface Device
SW5	Switch Expansion 5
HUB	Expansion Hub

Part numbers for the ReefKeeper systems are formatted using the character string "RKM-" in front of the abbreviations listed above. For example, the part number for a Power Controller 4 is "RKM-PC4".

Please note that the part numbers and a products abbreviation are both used within this user guide.

1 Included Hardware

Depending on what system package was purchased, the kit will have the following hardware.

System Level	RKE Basic	RKE Standard	RKE w/NET
RKE Headunit (GC1)	1	1	1
PC4	1	2	2
SL1	☐	1	1
NET	☐	☐	1
SID*	1	1	1
1ft Bus Cable	1	2	2
3ft Bus Cable	☐	2	2
6ft Bus Cable	☐	1	1
Temperature Probe	☐	1	1
Switch Adapter Kit	☐	1	1
Mounting Screws	4	8	10
6ft USB Cable	1	1	1
DA pH Probe	☐	1	1
Ethernet Cable	☐	☐	1

☐   Optional

Numbers indicate quantity included

* The SID is the device used to update the RKE and any modules via a USB port on a Windows computer.

ⓘ   *At the time of this printing, the Programming Application is only compatible with Windows XP 32-bit and Windows Vista 32-bit. It is not compatible with 64-bit versions, Apple OS or Linux OS.*

2 Getting to Know the ReefKeeper Elite

2.1 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 buildup 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.
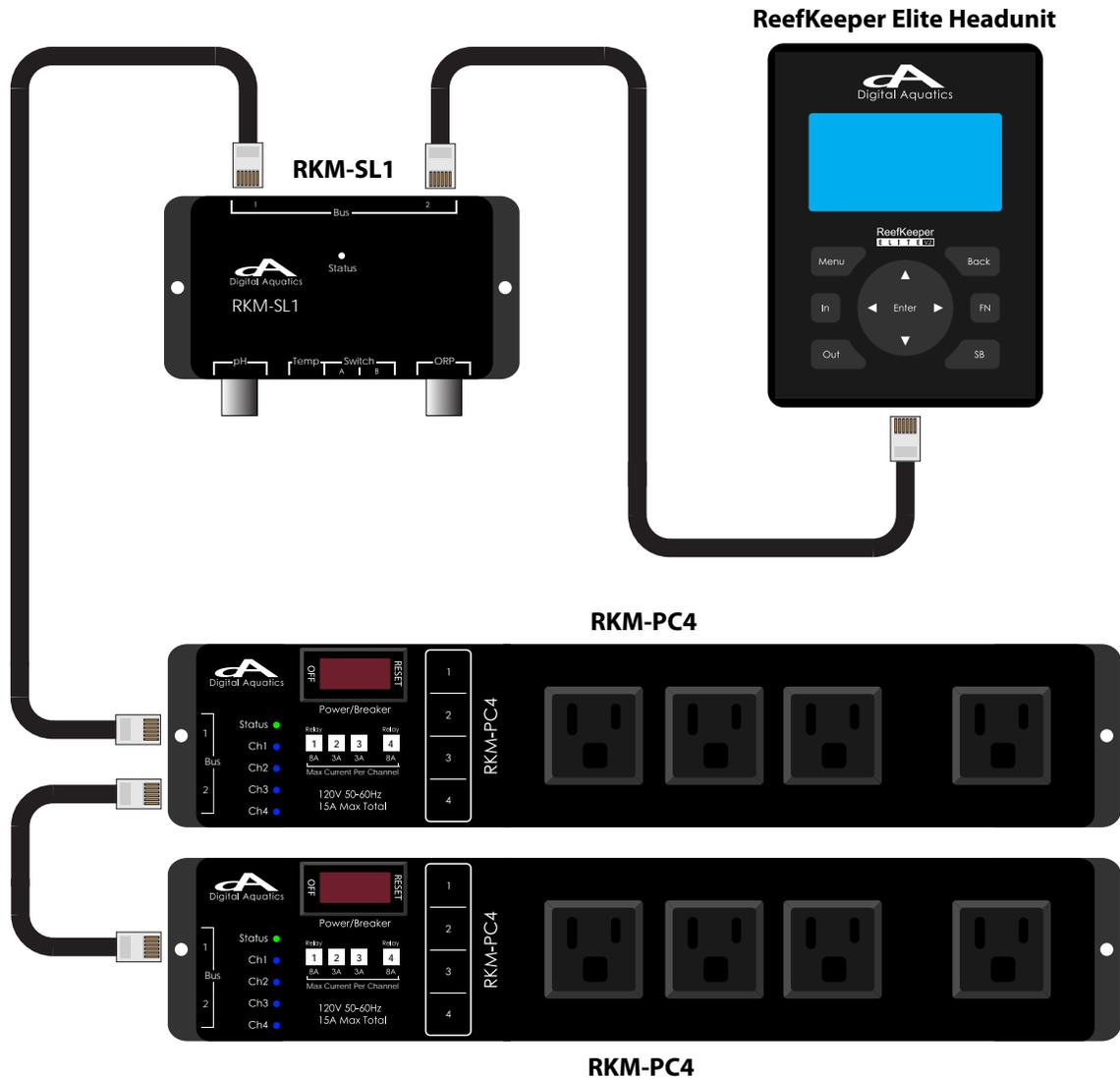

Figure 2a: *Example of a possible wiring configuration*

2.2 Installation and Setup

2.2.1 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.

This procedure is not required when using a V2 Headunit. These keys are mechanical and do not require calibration.

2.2.2 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
- 100' 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.

2.2.3 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 RKE headunit.

1. Side tabs with screws.
2. Slots on the back panel allow the head unit to mout by sliding it down over two screws. For an increased cosmetic appearance the side mounting tabs can be broken off and removed.
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 RKE system to be used for mounting the headunit.*

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 user guide for any special instructions that must be followed.

2.3 Updating Firmware

See the RKE Firmware Update Instructions for more information.

2.4 How to Navigate the System Guide

2.4.1 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	[Menu]
Inputs	[In]
Outputs	[Out]
Back	[Back]
Function	[FN]
Standby	[SB]
Up Arrow	[Up]
Down Arrow	[Down]
Right Arrow	[Right]
Left Arrow	[Left]
Enter	[Enter]

Whenever an instruction calls for a key press 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 follow these steps.

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 press [FN] to quickly jump to the save option. Press [Enter] and the changes will be stored.

2.4.2 Understanding the Interface
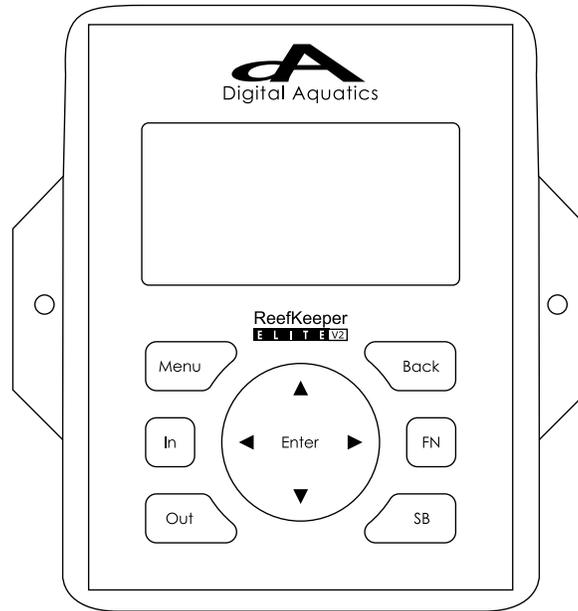
Figure 2b: *Front of the ReefKeeper Elite Head unit*

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

Menu
Pressing 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
Pressing the [In] 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
Pressing the [Out] 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.

Function
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.

Function Hot keys
1. While in a settings screen, pressing [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 press [FN] to quickly view it's graph. If the selected item is not currently being graphed a message will appear.
3. Pressing the [FN] key while an alarm is present will acknowledge the alarm.

Standby
While on the Home Screen, [SB] functions as quick access to either of the four standby modes. The user can toggle through all of the standbys and then press [Enter] to select one. Before or after a standby mode has been invoked, pressing the [Back] button will cancel the standby action and return the user to the home screen.

(i)   *The [SB] key is only active on the home screen.*

2.4.3 General Notes
The following are general notes for the ReefKeeper Elite controller and intended to apply to numerous entries in this user guide.

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

Timeout
If the controller is left with no interaction from the user for 3 minutes it will time out and return to the home screen.

(i)   *Due to the specific process required during calibration, the timeout period will not take affect when in the calibration menu.*

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

3 Home Screen

3.1 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.

Date   Time

Home Data
Type A

Wavemaker   Sound   Battery   Key Lock

Day / Night Mode   Wireless   NET Communication
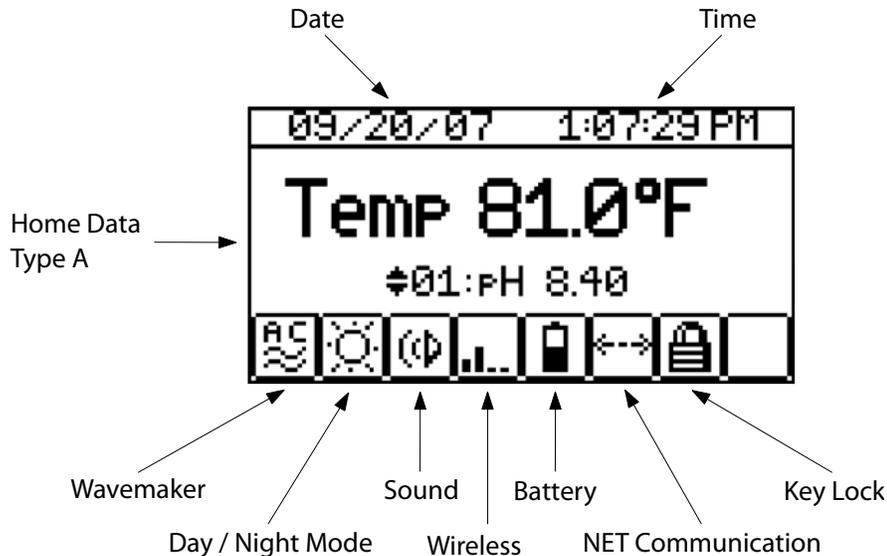
Figure 3a: *The Home Screen*

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.

3.1.1 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.

3.1.2 Quick Data

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

3.1.3 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
Intended for future use.

Battery icon
Intended for future use.

RKM-NET Communication icon
Shows network activity when a RKM-NET Network Interface Device is plugged into the RKE system.

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

4 System Menu

4.1 Settings

To enter into the settings menu, press 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, press [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].

4.1.1 General "Gen"
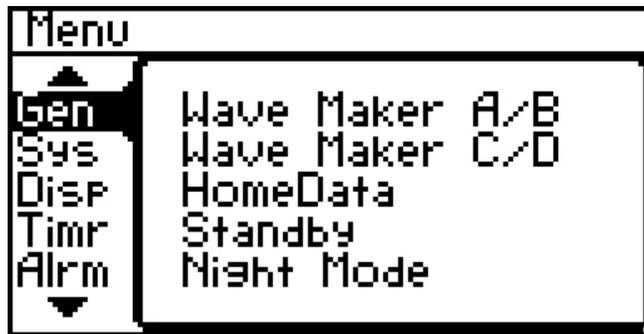
Figure 4a: *The General menu*

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
W.M. C	Wavemaker C Duration	HH:MM:00 or 00:MM:SS

Item	Description	Options
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
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
SB 3	Standby 3 Duration	MM:SS
SB 4	Standby 4 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.
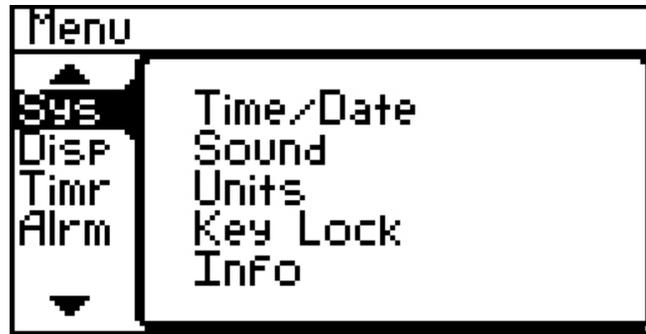
4.1.2 System "Sys"

Figure 4b: *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	Press [Left] and [Right] to highlight a field and then 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	Press [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.

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 can display units in either Fahrenheit or Celsius.

Item	Description	Options
Temp	Temperature Type	° C / ° F

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]

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Info

Item	Description	Options
Rev:	Displays the current firmware revision. Pressing [Enter] with "Rev:" selected will update and display the current value.	N/A
Detached	Displays the number of modules that have been registered with the system but are not currently connected.	N/A

Factory Defaults

Factory Defaults have been split into seperate sections. This allows certain areas and settings to be reset while other remain intact. Running a complete Factory Reset will cause the RKE headunit to re-register the modules connected to the system. This may cause new IDs to be assigned to each module.
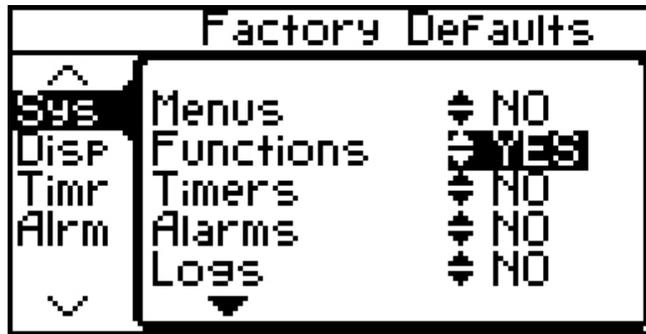
Figure 4c: *The Factory Defaults*

(i) *Factory resets will not affect the calibration data on the individual modules.*

Item	Description	Options
Menus	This will reset the stored settings within the General menu, System menu and Display menu. Both Wavemaker settings and the system time will **not** be reset using this option.	YES / NO
Functions	This will reset all of the stored settings for Functions.	YES / NO
Timers	This will reset all of the stored settings for Timers. This reset includes both of the Wavemaker settings.	YES / NO
Alarms	This will reset all of the stored settings for Alarms	YES / NO
Logs	This will erase all stored logging data.	YES / NO
Reset All	This will completely reset all settings, programs and logs. This should only be used as a last resort in the event the ReefKeeper Elite settings are unusable.	YES / NO

Factory Defaults and the RKM-NET

The RKM-NET relies on continuous communcation with the RKE headunit of the system. Many of the configurations on the RKM-NET are built off the module list on the headunit. A factory reset of the headunit will in most cases cause the module list to rearrange itself and thus the configurations on the RKM-NET are no longer valid. Becuase of this, a complete factory reset on the RKE headunit will initiate a reset of both the Logging / RSS settings and the Custom Naming settings. This includes a complete reset of the following:

- Custom Module Names
- Custom Port Names
- All logged port data
- All Logging / RSS slots

All other configurations and settings will remain untouched.

4.1.3 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.
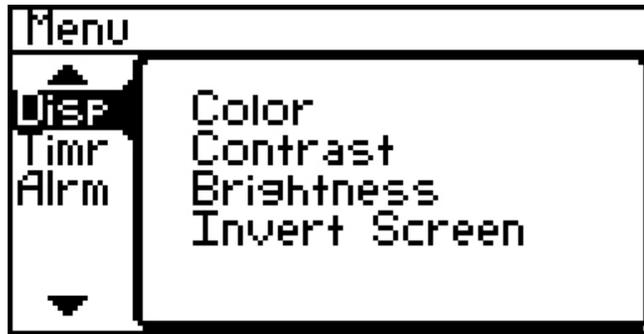
Figure 4d: *The Display menu*

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 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

Item	Description	Options
Invert	Invert Display	ON / OFF

4.1.4 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.
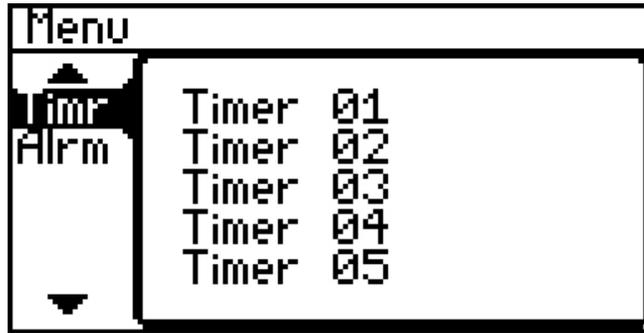
Figure 4e: *The Timers menu*

All the timers have the same layout and options.

Item	Description	Options
DoW	DoW is set by toggling the seven options to either "-"or the leading letter of the day. "S - T W T - -" would represent Sun, Tue, Wed, Thr to be on and would represent Mon, Fri, Sat to be off .	Toggle "SMTWTFS"
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.	HH:MM:00 or 00:MM:SS

Item	Description	Options
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.	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. 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.

Example Settings for a Timer

The following settings will result in an error and the results will not be as expected. The On Duration and Off Duration will result in combined 8 hour cycle. When the cycle starts on Monday, it will repeat this 8 hour cycle four times pushing it into Tuesday. Therefore the Tuesday cycle will not start and the function will be stalled until Wednesday's start time. This setup would also affect Thursday in the same fashion.

DOW	- M T W T F -
Start At	10am
Time ON	04:00:00
Time OFF	04:00:00
Repeat	4
Oscillate	Off

4.1.5 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. 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 used strictly as an audible/visual alert to a set condition.
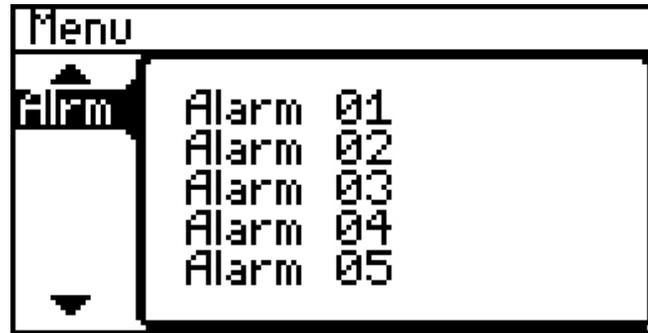

Figure 4f: *The Alarms menu*

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

Once an alarm is set, 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*

Device 1, Device 2 and Device 3

Item	Description	Options
Device	The Device selection allows any item in the system to be selected as a trigger.	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 value.	Above Below

Logic

This setting controls the form of logic used when more than one device has been set.

Item	Description	Options
Logic	The AND logic choice implements logical conjunction. An alarm will be activated only if all configured devices are triggered. If less than the total number of configured devices are triggered, the alarm will not be activated.	AND
	The OR logic choice implements logical disjunction. An alarm will be activated if any or all configured devices are triggered. If none of the configured devices are triggered, the alarm will not be activated.	OR

Alert

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
Alert	Alerts are set by toggling the three options to either "-"or the leading letter for each option. Flash is depicted by an "F" and will cause the headunit's display to flash a red backlight after an alarm has been activated. Beep is depicted by a "B" and will cause the headunit to make an audible beep after an alarm has been activated. Email is depicted by an "E" and will cause email notifications to be sent via the RKM-NET. This function requires additional configurations on the NET module as well.	Toggle "FBE"

5   Inputs Menu

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.

5.1 Input Screen

To access the Input Screen, press the [In] key.

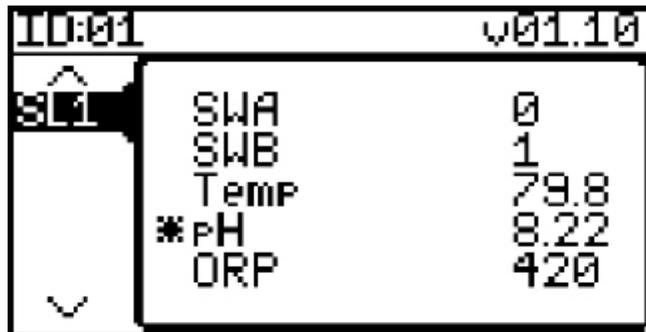**Figure 5a:** *Displays the available inputs for the selected device*

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 highlighted, the right window shows its inputs and the current values for those inputs.

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

5.2 Input Options

To access the Input options navigate with the arrow keys to the input of interest. Press 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 5b: *The Input options*

5.2.1 Calibrate

If calibration is not possible for the selected device this option will not be available.
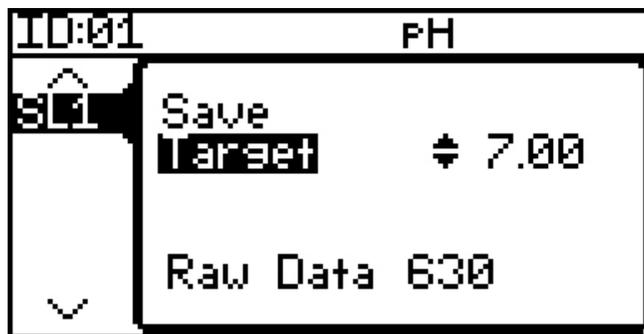
Figure 5c: *Example calibration screen*

There are two types of calibrations that can be done depending on the probe, single point or double point calibration.

Single Point Calibration (Temperature, ORP)

When doing a single point calibration, follow the steps below:

1. Set the target data using the [up] and [down] arrows. In most calibrations where a reference solution is used, adjusting the target data is not required.
2. Once the target data has been set, press [Enter] and place the probe in the calibration solution.
3. Once the "Raw Data" value has stabilized, press [Enter] to save the calibration.

In some cases the "Raw Data" value will not completely settle on a single value. Also, the "Raw Data" value is used internally and does not reflect a value in a probes input range.

Double Point Calibration (pH)
When doing a double point calibration, follow the steps below:

1. Set the target data using the [up] and [down] arrows. In most calibrations where a reference solution is used, adjusting the target data is not required.
2. Once the target data has been set, press [Enter] and place the probe in the calibration solution indicated by the Target value.
3. Once the "Raw Data" value has stabilized, select "Next" and press [Enter] to continue to the next calibration point.
4. Rinse the probe in RO water.
5. Transition the probe to the second packet of calibration solution.
6. Repeat steps 1 through 3 for the second calibration point.

In some cases the "Raw Data" value will not completly settle on a single value. Also, the "Raw Data" value is used internally and does not reflect a value in a probes input range.

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

5.2.2 Enable Graph

Graph	Selects whether or not this port should be logged.	YES / NO

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

5.2.3 Show Graph
Please see Chapter 7 for a more detailed explanation of the graphing.

6 Outputs Menu

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

6.1 Output Screen
To access the Output screen, press the [Out] key from the Home Screen
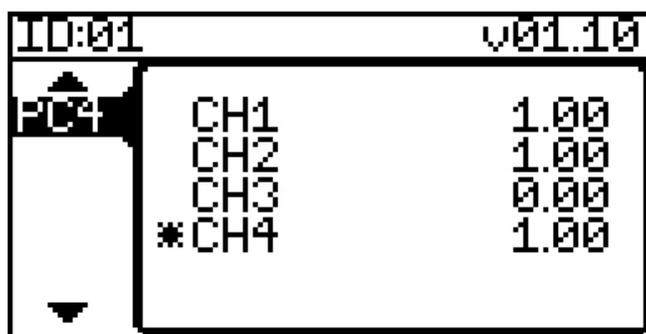
Figure 6a: *The Outputs Screen*

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 highlighted.

(i) *While cycling through the connected modules the selected modules status LED will flash. This will assist in identifying the highlighted module.*
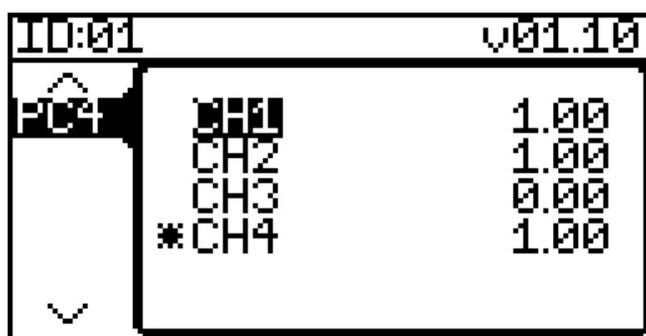
Figure 6b: *The available outputs for the selected device*

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 to the output of interest. Press 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.

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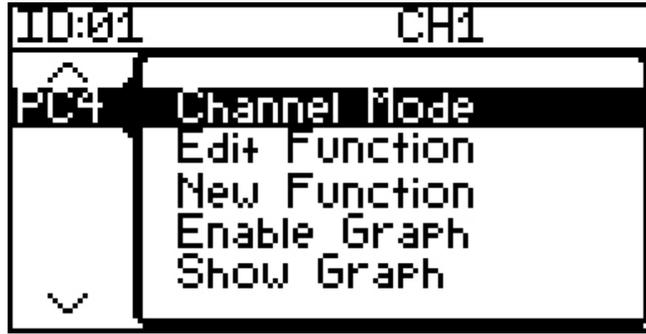
Item	Description	Options
Mode	**AUTO:** Setting a channel to "Auto" puts the channel under the control of the function assigned to it. **ON:** Setting a channel to "On" will override that channels function to an on state and it will not follow the program. **OFF:** Setting a channel to "Off" will override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

Graph	Selects whether or not this port should be logged.	YES / NO

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

6.2.5 Show Graph

Please see Chapter 7 for a more detailed explanation of the graphing.

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 sections 4.1.4 and 4.1.5 if needed. Each Function has unique features that differentiate it from the others. While functions have names such as pump or light, they can be used however the user would like or for any particular operation or feature 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
- Switch

(i) *Setting up a channel using the key pad is intended to be as straight forward as possible. To complete an entry, press 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

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. If a pump is set to turn off, 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.

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

(i) *More programming examples can be found on our support forum at:*

www.forum.digitalaquatics.com

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
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. This can be set by toggling the four options to either "-" or the Standby number.	Toggle "1234"
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

6.3.2 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.

The controller function is often used for devices such as, Heaters, Chillers, Fans, Dosing pumps, Auto top off (ATO) pumps and 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

More programming examples can be found on our support forum at:

www.forum.digitalaquatics.com

Item	Description	Options
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. This can be set by toggling the four options to either "-" or the Standby number.	Toggle "1234"
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

Controller Function Examples

These examples have been designed to give a breif description of the settings required to generate an intended result using the controller function.

Example Settings for a Heater
This example covers the basic function of turning on a heater when the temperature has reached a low point.

Device	Temp (any temp probe can be used)
Set Point	78.0
Hysteresis	0.1 * 0.1 is a the smallest useable hysteresis that can be set for temp and is suggested.
On When	Below

No alarms or standby are needed to operate a heater.

Example Settings for a Fan or Chiller

This example covers the basic function of turning on a chiller when the temperature has reached a high point.

Device	Temp (any temp probe can be used)
Set Point	78.0
Hysteresis	0.1 * 0.1 is a the smallest useable hysteresis that can be set for temp and is suggested.
On When	Above

No alarms or standby are needed to operate a fan or chiller.

Example Settings for a pH Controller

This example covers raising pH and it should be noted that an SL1 is needed to monitor pH.

Device	pH
Set Point	8.25
Hysteresis	0.05
On When	Below

Example of Hysteresis

This example shows a temperature graph for a common setup utilizing the controller function to turn on and off a heater. When using the Controller function for a heater, the function setting for "On When" should be set to "Below". Hysteresis is abbreviated by H.
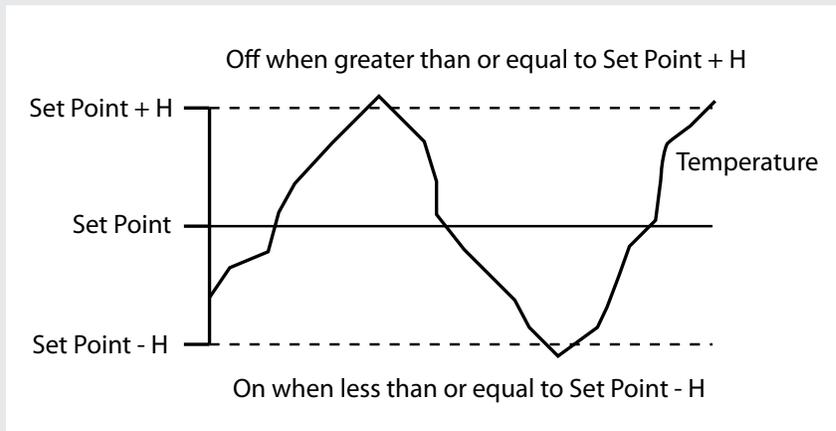
Off when greater than or equal to Set Point + H

Set Point + H

Temperature

Set Point

Set Point - H

On when less than or equal to Set Point - H

6.3.3 Multi-Timer

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

(i) *If no Timers have been selected, the output of this function will be off.*

Item	Description	Options
Timer	First timer	None Timer 1 - 63
Timer	Second timer	None Timer 1 - 63
Timer	Third timer	None Timer 1 - 63
Timer	Fourth timer	None Timer 1 - 63
Standby	Select whether this function should be affected by Standby. This can be set by toggling the four options to either "-" or the Standby number.	Toggle "1234"
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

6.3.4 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 refire.

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. This can be set by toggling the four options to either "-" or the Standby number.	Toggle "1234"
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

(i) *More programming examples can be found on our support forum at:*

www.forum.digitalaquatics.com

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

6.3.5 Advanced Light "Adv. 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
Ramp	Sets the ramp duration in minutes.	0 - 250
Intensity	Light Intensity	0-100
Temp	Light Temperature in Thousands of Kelvin.	6K, 10K, 12K, 15K, 20K, 25K
Timer	First timer	None Timer 1 - 63
Standby	Select whether this function should be affected by Standby. This can be set by toggling the four options to either "-" or the Standby number.	Toggle "1234"
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. The Lunar function will set the output to follow the nightly intensity of the moon.

This function has the option of being configured to any output on the system. Please remember that only the MLC and ALC can vary the output intensity of a channel and thus other types of outputs configured to this function may give unwanted results.

Intensity	Sets a scaling factor for the moonlight intensity. This feature is most commonly used for users that would like to reduce the overal intensity of their moonlight pods.	0 - 100
Standby	Select whether this function should be affected by Standby. This can be set by toggling the four options to either "-" or the Standby number.	Toggle "1234"

More programming examples can be found on our support forum at:

www.forum.digitalaquatics.com

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

6.3.7 Switch

The Switch function allows a device to be controlled based on a standard boolean port. This function will turn on the output channel once the device has triggered and will keep the channel on until the configured Timer has finished.

The Switch function has the option of being configured using any port on the system. Please remember that only boolean devices such as a switch or output channel will operate correctly. Configuring a Switch function using other types of types of inputs such as Temp and pH may give unexpected results.

Device	The Device selection allows any item in the system to be selected as the trigger for the output state.	All inputs and outputs
ON when	This sets the condition for when the channel should power the device plugged into it.	High / Low
Timer	Timer to be initiated once the device has triggered.	None Timer 1 - 63
Standby	Select whether this function should be affected by Standby. This can be set by toggling the four options to either "-" or the Standby number.	Toggle "1234"
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

More programming examples can be found on our support forum at:

www.forum.digitalaquatics.com

7 Data Logging and Graphing

7.1 Using Graphs

The ReefKeeper Elite has been designed to incorporate internal data logging of up to 32 unique devices. Any single data log can contain up to one week of data, stored at a 10 minute resolution.

Selecting "Show Graph" and pressing [Enter] will show the current graphed history of the selected port. The Graph window was changed to give increased functionality in V1.10.
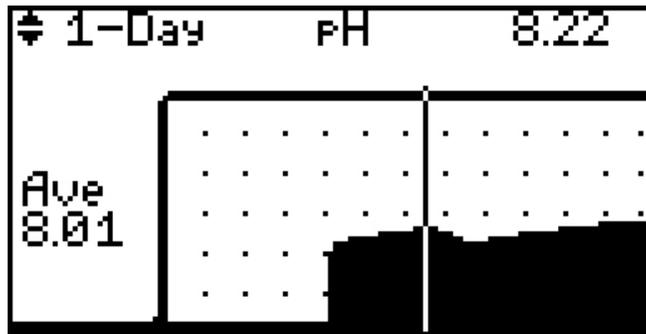

Figure 7a: *Example graph of pH set to a range of 1-Day*

1. Pressing up and down will cycle through 1-Day and 5-Day mode respectivly.
2. Displays the port type.
3. Displays the current port value based on the location of the cursor.
4. Displays the current port average value. This is calculated from the entire logging buffer for the port.
5. The cursor is used to find the value at different locations within the data.

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

8 Product Guide

This senction outlines the current Digital Aquatics product lineup.

System Modules

Part Number	Product Name
30-0014-001	RKM-PC4
30-0028-001	RKM-PC1
30-0015-001	RKM-SL1
30-0013-001	RKM-SL2
30-0018-001	RKM-MLC (White)
30-0018-002	RKM-MLC (Blue)
30-0023-001	RKM-ALC
30-0024-001	RKM-NET
30-0006-000	Expansion Socket
30-0026-001	RKM-SW5
30-0030-001	RKM-HUB

System Probes

Part Number	Product Name
30-0007-XXX	Digital Aquatics Temp Probe
30-0008-002	Digital Aquatics pH Probe Kit
30-0020-002	Digital Aquatics ORP Probe Kit
30-0031-000	Digital Aquatics Salinity Probe Kit
30-0008-000	Pinpoint pH Probe Kit
30-0020-000	Pinpoint ORP Kit

System Accessories

Part Number	Product Name
30-0019-000	MLC Pod (White)
30-0019-001	MLC Pod (Blue)
30-0008-001	pH Callibration Packets
30-0017-000	Switch Adapter Kit
30-0022-000	Bus Cables (3 x 1')
30-0022-001	Bus Cables (2 x 3')
30-0022-002	Bus Cables (2 x 6')
30-0022-003	Bus Cables (1 x 10')
30-0022-004	Bus Cables (1 x 20')
30-0022-005	Bus Cables (1 x 30')
30-0022-006	Bus Cables (1 x 50')

9 Troubleshooting

In order to offer our customers the highest level of support, Digital Aquatics has opened a public forum dedicated to the support of our products. This forum allows us to offer the most up to date information and support of our products as well as building a knowledge base for the aquarium industry. Our forum can be found at www.forum.digitalaquatics.com.

10 Notes