



ReefKeeper Lite

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 Lite 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

RKL	ReefKeeper Lite
GC2	ReefKeeper Lite Headunit
PC4	Power Controller 4
SL1	System Lab 1
SL2	System Lab 2
MLC	Moon Light Controller
SID	System Interface Device
ALC	Advanced Light Controller
NET	Network Interface Device

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 manual.

Included Hardware

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

System Level	L1	L2	L3
RKL Headunit (GC2)	1	1	1
RKM-PC4	1	1	2
RKM-SL1	<input type="checkbox"/>	1	1
RKM-SID*	1	1	1
1ft Bus Cable	1	<input type="checkbox"/>	<input type="checkbox"/>
3ft Bus Cable	<input type="checkbox"/>	<input type="checkbox"/>	1
6ft Bus Cable	<input type="checkbox"/>	1	1
Temperature Probe	1	1	1
Mounting Screws	4	6	8
DA pH Probe	<input type="checkbox"/>	<input type="checkbox"/>	1

Optional

Numbers indicate quantity included

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

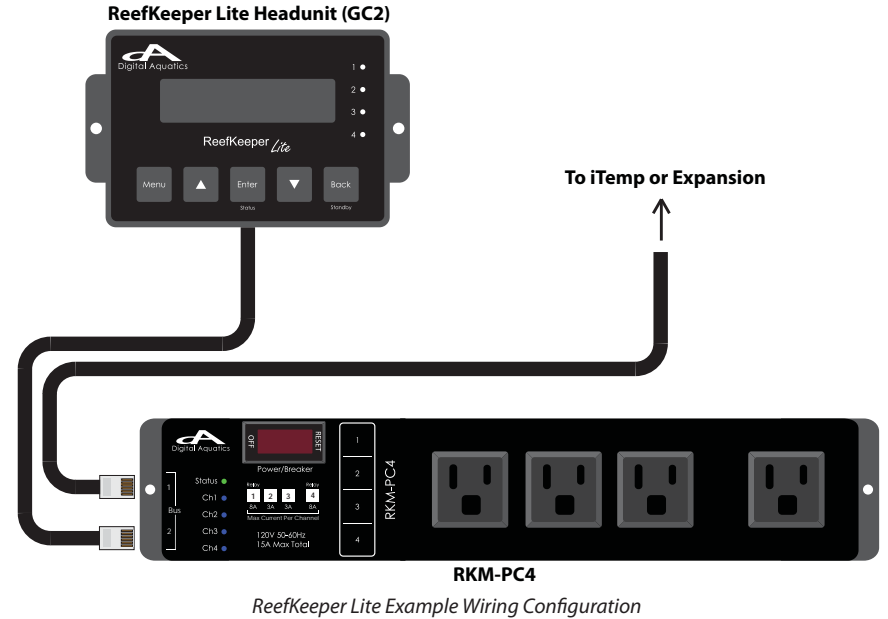


At the time of this printing, the Programming Application is only compatible with Windows XP 32-bit and Windows Vista 32-bit. It is not compatible with the Apple OS or Linux OS.

Installation

The ReefKeeper Lite (RKL) is a modular system. All modules are connected one to another via the bus cables included with the system. There is not a specific order when connecting modules to the system, nor is there a required port order.

The RKM-PC4 is the module that provides power to the rest of the system, eliminating the need for an unsightly power supply.



There is no required order when connecting a ReefKeeper Lite system.

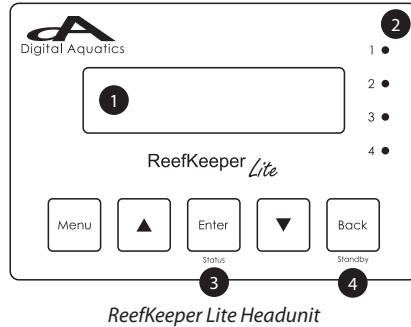
iTemp

The ReefKeeper Lite System has the unique ability to monitor temperature from a probe connected directly to the system bus. The probe consists of a standard temperature probe with an RJ bus connection on one end. This allows the probe to be connected at the end of the bus chain and lets the RKL system monitor temperature without the usage of an SL1. Besides the physical connection of the iTemp probe, iTemp is treated exactly the same as any other input on the system.

Mounting

RKL Head unit (GC2)

Mount the head unit in a location where it will be easily accessed for daily operation. While the face of the head unit is splash proof, proper ventilation is important.



1. ReefKeeper Lite LCD Screen
2. Module Indicator LEDs
3. Dual usage Enter / Status key
4. Dual usage Back / Standby key

Temp Probes

The temperature included with every RKL system is a long cable consisting of a slightly larger tip than the cable thickness on one end and an RJ connection on the other.



ReefKeeper Lite Temp Probe

RKM-PC4

Mount the RKM-PC4 in a well ventilated location. Also, make sure it can be accessed in the event maintenance must be done, such as a firmware upgrade.

RKM-SL1

Mount the RKM-SL1 in a well ventilated location; close enough to the tank or sump so that all probe wires can reach their mounting locations. Also, make sure it can be accessed in the event maintenance must be done, such as a firmware upgrade.

Bus Cable Routing

It is important to make sure bus cables are routed in a way that will keep them safe. Make sure they cannot get pinched or crimped. Damaging a bus cable can cause system wide failure.

It is also important to keep bus cables clear of lighting ballasts and wiring. Bus cables can pick up electronic noise and in extreme cases that noise can cause interference to the system.

Home Screen

When on the home screen, there are a number of functions that can be performed that are quite useful. By pressing [up] or [down] the user can scroll through all available ports. Stopping on a given item will leave that item's information displayed on the screen until changed. This is useful if attempting to monitor a particular value over time.

Likewise, the head unit keeps a record of the last six hours of all ports. With the item of interest on the display, press [Status] to view its historical information. Scroll [up] and [down] through the min, max and average values of the selection.

Another function that can be accessed on the home screen is Standby. Pressing [Standby] and then pressing [Enter] activates the Standby timer. This will shut down the programmed items to allow for feeding or servicing of the tank. After the Standby expires, all affected functions will return to their normal operations.



Standby can be exited at any time by pressing [Back].

Menu Overview

Pressing [Menu] enters the menu system. The menu system is structured as follows.

- General
- System
- Outputs
- Inputs
- Timers
- Alarms

Pressing the arrow keys will navigate through the menu options listed above. Once the desired item is flashing, press [Enter] to make your selection.

Navigating through the menu and making changes is quite easy. Each time a change is made to a setting or control function press the [Back] button to get to the save point. The save point is indicated on the Menu screen to the right of the setting that has been modified by a flashing "Save". Pressing [Enter] will save the settings, while pressing [Back] will retain the past setting ignoring the modifications made.

General Menu

Brightness

Brightness is a setting that's dependant on the 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	Brightness when not in Night Mode	0 - 10
Night Brightness	Brightness when in Night Mode	0 - 10

Standby

Standby is a user configurable mode that will stall/halt channels as defined by the user to perform feedings, maintenance or any other tasks. Standby is often used to stop all pumps in the system when performing feedings and or other maintenance tasks.



Standby can be started by pressing the [Back] / [Standby] key on the headunit and then pressing [Enter].

Item	Description	Options
Standby	The Standby setting can be set from 59:59 to 00:01. Standby is started by pressing [Enter] once "Standby" is displayed on the screen.	MM:SS

Night Mode

Night Mode allows the user to establish a global time period that affects all devices associated with it. This can include pumps, moonlights, and other devices the user would like to have special attributes at night.

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

Temp Type

Item	Description	Options
Temp Type	This setting affects the units that will be displayed for temperature.	° C / ° F

Sound

Item	Description	Options
Sound	This setting turns on or off the sounds associated with key presses.	On / Off

System Menu

Wavemaker (WM A/B)

The wavemaker setting allows the user to configure two opposing cycles, A and B.

Item	Description	Options
WM A	Wavemaker A Duration	HH:MM:00 or 00:MM:SS
WM B	Wavemaker B Duration	HH:MM:00 or 00:MM:SS

Time/Date

This section is where the systems time and date are set.

Item	Description	Options
Time	This is where the system time for the ReefKeeper Lite is set.	HH:MM:SS
Date	This is where the system date for the ReefKeeper Lite is set.	YYYY MM DD

Lock Keys

Item	Description	Options
Lock Keys	This menu allows the user to lock out the key pad of the ReefKeeper Lite.	Yes / No



To unlock the key pad enter the following key sequence: [up], [down], [up], [Enter].

Info

Item	Description	Options
Info	This will display the current firmware version loaded on the head unit.	N/A

Factory Defs

This option will completely clear all saved system and general settings, controls, alarms, and timers. The only item NOT affected by this is the system time/date. Never perform a factory defaults action unless attempting to completely restart the system.



This action will NOT affect any probe calibrations. Calibration data is stored in the individual modules.

Item	Description	Options
Factory Defs	Performs a factory default.	Yes / No

Outputs Menu

Entering Outputs will give the user access to the channels on each of the PC4s and the output of the MLCs. The corresponding indicator LED will flash as the different PC4s or MLCs are accessed. Once the desired channel is active, press [Enter] to view the available options seen below.

- Mode
- Function
- Alarm
- Standby

Mode Options

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

Function Options

None

The None function sets a port to always off. This function can however be controlled by Alarms and or Standby.



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

www.forum.digitalaquatics.com

Pump

The Pump function allows for the control of pumps with the integration of a number of key features such as Wavemaker, Night mode and post Standby delay.

Item	Description	Options
Type	Active during wavemaker A.	W.M. A
	Active during wavemaker B.	W.M. B
	Always on.	Sump/Skim
At Night	Will leave the pump active in Night mode.	On
	Will stop the pump while in Night mode.	Off
Standby Delay	When exiting Standby, the pump will remain off for the Standby delay duration. Commonly used for holding skimmers off after a feeding so the food is not over skimmed from the system. This is not the value set for Standby. System standbys can be configured in the standby menu.	HH:MM:00 or 00:MM:SS

Controller

The Controller function is commonly used for controlled outputs based on an input range such as Temperature and pH.

Item	Description	Options
Device	Selects the port used with this function.	Any port
Set Point	The point at which the controller will take action.	Specific to each device
Hysteresis	The window or range that the control function operates on. See an example of hysteresis on the next page.	Specific to each device
On When	The control function will be on when greater than or equal to the set point plus the value for Hysteresis.	Above
	The control function will be on when less than or equal to the set point minus the value for Hysteresis.	Below



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Controller Function Examples

These examples have been designed to give a brief 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	iTemp (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	iTemp (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.

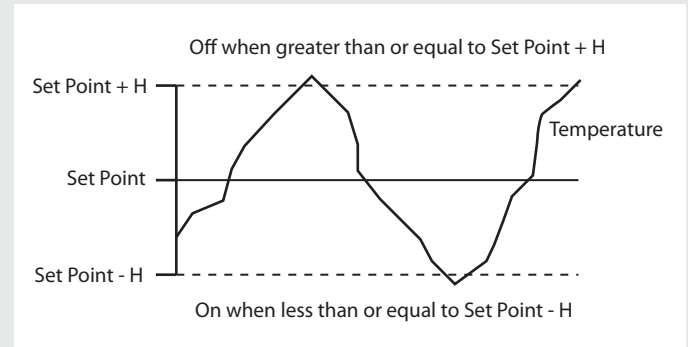
Example Settings for a pH Controller

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.



Multi-Timer

The Multi-Timer function controls an output based on the combination of two independent Timers allowing for a more complex timing schedule.

Item	Description	Options
Timer 1	Assign the first timer for the multi-timer to follow.	Timer 1 - Timer 16
Timer 2	Assign the second timer for the multi-timer to follow.	Timer 1 - Timer 16

Light

The Light function allows the integration of a timed lighting cycle with or without the Sure-on protection for Metal Halide bulbs.

Item	Description	Options
Type	The MH or Metal Halide type invokes a protection called Sure-on that prohibits the MH Bulb from re-firing within a 15 minute window after a power interruption.	MH
	The Other type invokes a standard on/off operation that turns on immediately after power interruptions.	Other
Start	Time at which the channel will turn on.	HH:MM:00 or 00:MM:SS
End	Time at which the channel will turn off.	HH:MM:00 or 00:MM:SS



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The RKL can be programmed to turn off your lighting if the tank temperature gets too high. This is helpful when running Metal Halides as they can raise tank temperatures by several degrees on warm days when a tank is more susceptible to the ambient temperature of the environment.

1. Set up an alarm to be triggered by the main temp probe in the system (iTemp or Temp). See page 17 for how to setup an alarm.
2. Once a channel/outlet has been programmed as a Light, scroll down to the Alarm option and press [Enter].
3. Select the alarm number created in step 1 and select an action. In this case you want the channel to turn off if the alarm is tripped. Be sure to set the trigger temp at least 2 degrees above your tanks set temp point to prevent your lights from turning off from small/normal fluctuations in temp.

Lunar

Setting an output to Lunar will allow an output to have a varying intensity based on the Lunar cycle.



Only the MLC has the ability to have a varying intensity output. Programming a PC4 channel with the Lunar function will not operate as expected!

Item	Description	Options
Intensity	This setting is a scaling factor for the overall intensity of the moonlights. Depending on the size of the tank and the coverage of Lunar Pods they can sometimes over power the tank in the evening. This setting allows the Lunar Pods to be scaled to best fit the tank or application.	00 - 99

Alarm Options

The Alarm options allow the user to set how an output will operate.

Item	Description	Options
Alarm	Selects the alarm to be associated with this channel.	0 - 16
Action	Selects whether the channel will be on or off when the associated alarm is triggered.	On / Off

Standby Options

Item	Description	Options
Use Standby?	Enable or disable the usage of Standby for this channel.	Yes / No
Action	Selects whether the channel will be on or off when in Standby.	On / Off



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Inputs Menu

The Inputs menu allows the user to perform calibrations for inputs. If an input has the option of being calibrated, pressing [Enter] on that input will show the words "Calibrate" on the screen.



It is often useful to save the calibration solution (if used) until the calibration is successfully completed.



If at any time a calibration step is done incorrectly, the calibration will need to be started over. Press [Back] and start again. This is not detrimental to the calibration process.

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. This is accomplished by changing each digit in the target and pressing [Enter] to move to the next target digit.
2. Once the target data has been set, press [Enter] with the last digit in the target value flashing. This will cause the "raw data" to begin flashing.
3. Once the "raw data" value has stabilized, press [Enter] to save the calibration.

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 to change a digit in the target, and [Enter] to move the next target digit.
2. Once the target data has been set, press [Enter] with the last digit flashing. This will cause the "raw data" to begin flashing.
3. Once the "raw data" value has stabilized, press [Enter] to save that calibration point. The screen will proceed to the second 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 4 for the second calibration point.

Timers Menu

Up to 16 unique timers can be programmed. Each timer can be set with a day of week (DOW), trigger time, duration "ON", duration "OFF", repeat and Oscillate. Be aware that timer changes made during the middle of a cycle will not be reflected until the next cycle begins.

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.	"-----" or "SMTWTFS"
Start	Time of day that the timer will start.	HH:MM:00 or 00:MM:SS
On Duration	Length of time the timer will be active.	HH:MM:00 or 00:MM:SS
Off Duration	Length of time the timer will NOT be active.	HH:MM:00 or 00:MM:SS
Repeat Count	Number of times the cycle will repeat. If repeat count is set to a number high enough to push the timer into the next cycle the next cycle will not start. The program will wait for the next uninterrupted start time.	00 - 63
Oscillate	Setting Oscillate to "ON" will start the output in a operation running from the On Duration to the Off Duration. When oscillate is set to On, the values for "DOW", "Start" and "Repeat Count" are ignored. The timer will begin cycling as programmed immediatly, using only the "On Duration" and "Off duration".	On / Off

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 10am
On Duration 04:00:00
Off Duration 04:00:00
Repeat Count 4
Oscillate Off

Alarms Menu

Up to 16 unique alarms can be programmed. Each alarm can be programmed with a Alert, Device, Set Point, and Trip.

Item	Description	Options
Alert	Indicates no alerts will be made. The alarm will continue to function as normal.	None
	Enables a flash and beep alert.	Flash & Beep
	Enables the audible alert.	Beep
	Enables the flash alert.	Flash
Device	Selects the sensor to be used with this alarm.	All inputs and outputs
Set Point	Point at which the alarm will trigger.	Specific to each device
Trip	Indicate if the alarm will be active either above or below the set point.	Above / Below



An Alarm can be disabled by setting the Devices to "None". Setting the Alert to "None" will not disable an alarm.



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