KH MANAGER

INSTRUCTION MANUAL

V1.0

The Aquarium Solution

PRODUCT INFORMATION 3

INTRODUCTION **3**

FEATURES **3**
Device Features
Control Features

UNPACKING **4**
Box Contents

KH MANAGER LAYOUT **4**
Main Unit
Display Screen

INSTALLATION 5

POSITIONING THE UNIT **5**

CONNECTING THE TUBING **5**

DOWNLOADING THE APP **6**

STARTING THE APP AND CREATING AN ACCOUNT **6**

CONNECTING THE KH MANAGER TO THE CLOUD **7**

DIRECT BLUETOOTH CONNECTION TO THE KH MANAGER **7**

STARTING THE KH MANAGER 8

IN APP STEP BY STEP GUIDE **8**

INSTALING THE FRONT HOUSING **8**

MIXING THE KH TEST REAGENT 9

CHECKING THE KH TEST REAGENT **9**

PERFORMING A TEST 10

SETTING THE ALERT THRESHOLD FOR KH AND PH **10**

TESTING **10**

PERFORMING A MANUAL TEST **11**

PERFORMING AN AUTOMATIC TEST **12**

DATA LOGGING AND MONITORING 14

SETTING THE REAGENT AND WASTE WATER MONITORING 15

AUTOMATIC KH BUFFER DOSING 16

ACTIVATING AND DEACTIVATING AUTOMATIC KH DOSING **16**

SETTING AUTO ADD MODE 17
Total Add Cap
Single Add Cap
Add KH Interval
KH Buffer Concentration

SETTING CUSTOM PLAN MODE 18
Setting The Plan
Add A Plan
Quick Add
Setting The Adjustment Parameters
Range
Method
Adjust Times
Stop Adjusting

CALIBRATING THE KH MANAGER 21

ENTERING THE CALIBRATION SETTINGS 21

CALIBRATING THE PH PROBE 21

CALIBRATING THE SALTWATER PUMP (TANK WATER IN) 22

CALIBRATING THE KH BUFFER SOLUTION PUMP (KH SOLUTION IN) 23

CALIBRATING THE KH TEST PUMP (KH REAGENT IN) 24

CALIBRATING THE KH 25

RESETTING THE CALIBRATION ON THE KH MANAGER 25

MANUALLY RUNNING THE PUMP HEADS 26

RUNNING THE SALTWATER AND KH BUFFER SOLUTION PUMPS 26

RUNNING THE KH TEST REAGENT PUMP AND WASTEWATER PUMP 26

RUNNING THE MAGNETIC STIRRER (STIRRING PUMP) AND ADJUSTING THE ROTATION SPEED 26

EMPTYING LIQUID FROM THE PUMP HEADS AND TUBES 27

GENERAL SETTINGS 27

RENAMING THE KH MANAGER 27

UPDATING THE KH MANAGER FIRMWARE 27

SETTING THE TIME 27

FACTORY SETTINGS RESET 28

REMOVING THE UNIT FROM YOUR KAMOER REMOTE ACCOUNT 28

PRODUCT INFORMATION

INTRODUCTION

KH Manager is a specialised, app controlled, stand-alone device, which automatically samples, tests and maintains the KH level your aquarium water.

This new unit has been developed in partnership between D-D and Kamoer for the European market, the KH Manager combines Kamoer's experience in the manufacture of high precision medical grade dosing equipment, with D-D's knowledge and understanding of the specific requirements for control of the alkalinity within a modern reef aquarium.

FEATURES

Device Features
- Fully automated KH testing and solution dosing functions
- Expandable for automatic multi-element dosing via optional add-on pump
- App controlled by Cloud Wi-Fi or local Bluetooth on IOS or Android devices
- Built-in LCD display screen showing status, progress and real-time testing
- Twin medical grade optical sensors for accurate reagent drop counting
- High precision stepper motor-driven pump heads using PharMed® long-life tubing
- Pump heads can be individually calibrated and easily serviced
- Data and programming stored on unit in case of power or connection loss
- Lab-grade pH probe
- DIN port for connection and expansion with other D-D / Kamoer dosing pumps
- Colour-coded tubing and ports for ease of identification
- Glass test beaker with automated magnetic stirrer and large stirring bead
- Digital scales and measuring cylinders included for accurate pump calibration
- Real-time clock with battery backup
- Slim, compact housing for easy installation, maintenance and use

Control Features
- Automatic and manual test mode functions
- 1 - 24 tests per day
- Testing frequency, daily / every 'X' days / specific days
- User-defined settings:
  - set KH level
  - minimum / maximum pH and KH levels
  - maximum KH solution additions and intervals
  - re-testing in the case of an abnormal high/low reading
  - test beaker flushing frequency (up to 10 times per test)
- In-app notifications:
  - data reporting on test results and dosing volumes
  - graphs showing historical pH and KH test results
  - display of test reagent, KH solution and wastewater bottle levels
- Push alerts for abnormal readings or low/high solution levels
- Automatic calibration alerts
- Firmware updatable via the Kamoer Remote app

UNPACKING

Please check for delivery damage before unpacking.

Once opened, please inspect the product for any visible damage and check all parts are included. If any defects are found when unpacking, please contact your retailer immediately.

Box Contents

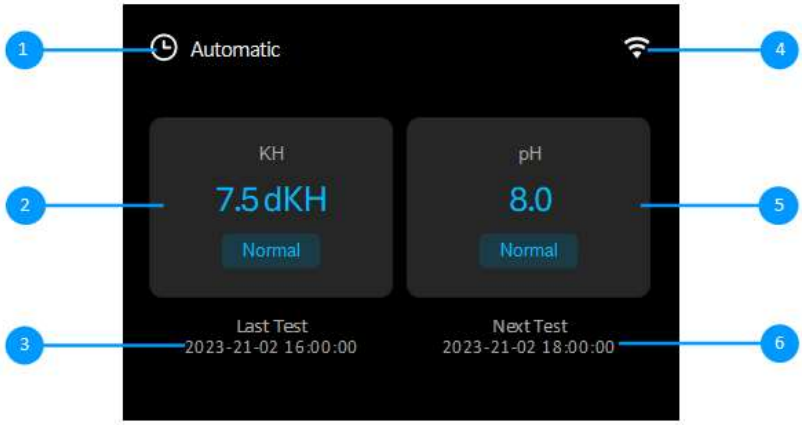
- Quick start guide
- KH Manager unit
- pH Probe
- Glass sample beaker
- 5ml Glass measuring cylinder
- 10ml Measuring cylinder
- High precision digital scales
- pH 4 and 9.18 Calibration solutions
- KH test reagent
- 5 x 2m colour coded PVC tubes
- Tube holder
- Quick release twist lock hose connectors
- Stirring bead
- Prefilter capsule
- Power supply

KH MANAGER LAYOUT

Main unit

1. LCD Display Screen
2. Removeable Cover Plate
3. pH Probe
4. Glass Test Beaker
5. Stirring Bead
6. DIN Connection Port
7. 24V Power Connection
8. Hinged Access Panel
9. Tank Water IN
10. Reagent IN
11. KH Solution IN
12. KH Solution OUT
13. Waste Water OUT

Display screen



1. Test Mode
2. Last KH Test Result And Status
3. Time And Date of Last Test
4. Wi-Fi / Connection Status
5. Last pH Test Result And Status
6. Time And Date of Previous Test

INSTALLATION

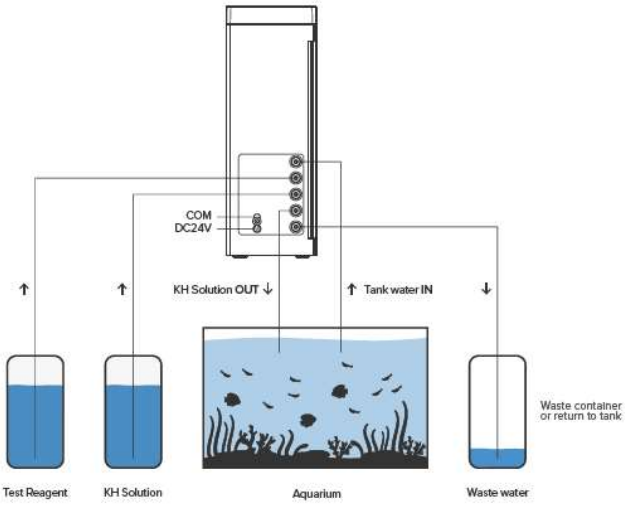
POSITIONING THE UNIT

The KH Manager is self-priming and can be placed above or below the water level. When there is big difference between the unit and the water height/reagent bottles, siphoning may occur. To avoid siphoning it should be placed in a position ensuring that the height difference is within 0.5m.

The unit should be secured into place or installed in a stable location not above open water or in very humid environments. **The surface must be flat and level to ensure correct operation.**

The inlet tubes for the KH Reagent, Aquarium Water inlet and KH buffer solution should be as short as possible and be positioned so that they always remain submerged, the outlet tube to waste and for the KH buffer solution should be positioned so they are above water level.

CONNECTING THE TUBING



Attach the tubing using the twist lock connectors as shown in the diagram above, matching the coloured hose to the correct coloured port. It is important that any hose connections are properly locked, to avoid air being drawn in. Ensure that the supplied filter is fitted to the end of the green pipe which takes sample water from the sump and is positioned so that the end will always remain submerged but will not draw in debris which may clog the hose and cause false test results.

If the KH Manager is only being used for monitoring and not for the automatic dosing of a KH buffer solution the black hose (KH Solution IN) and blue hose (KH Solution OUT) will not need to be connected or used.

The waste water from the unit, as a result of a test or from flushing the sample beaker before a test, can be returned to the sump or sent to a waste liquid container. If the waste water is being returned to a sump it should be positioned in a high flow area downstream from where the sample water is being collected, this will ensure a fresh sample is being taken for best accuracy when testing. If the waste water is being sent to a waste liquid container then new saltwater will need to be added to the aquarium to replace the amount removed by the test procedure to ensure a stable salinity and excess toping of freshwater from an auto top up system. This can be done manually or automatically via a separate dosing pump that is set to match the water usage of the KH Manager.

DOWNLOADING THE APP

Option 1: Scan the QR code and download the Kamoer Remote app with the corresponding cloud icon below.

Option 2: For manual install, Apple users – enter the App Store, Android users – enter the Play Store, search for ‘Kamoer Remote’, find the app and download.

Note: The Kamoer Remote App supports iOS 9.1 and above and Android 4.4 and above

STARTING THE APP AND CREATING AN ACCOUNT

When starting the Kamoer Remote app for the first time you will need accept the user agreement and confirm the app permissions. **It is important that permissions are allowed for notifications, Bluetooth and network to allow the app to work correctly.**

Once the user agreement has been accepted you can scan the QR code on the back of the KH Manager or choose the option 'No Devices' at the bottom of the screen. Follow the prompts to set the app permissions and location. **It is important that location permissions are on when using the app and that the correct region is selected, failure to do this may cause connection issues.**
Create a login account using an E-Mail address or mobile number. Choose the preferred option on screen and then 'Free Registration'. If using a mobile number please note that it needs to be entered in an international format with the correct region code selected and the first zero removed, i.e. A UK mobile number 07123456789 would be entered as +44 7123456789.

CONNECTING THE KH MANAGER TO THE CLOUD

For full access to all the features of the KH manager it will need to be connected to a home router and registered on your Kamoer Remote account. This will allow you to take advantage of the data logging, notifications, and the ability to access the unit remotely.

Ensure that power is switched on to the KH Manager, that your mobile device is connected to your home 2.4G Wi-Fi network and that all app permissions for the Kamoer Remote app on your mobile device are set to **ON**. Please note connection to a dedicated 5G Wi-Fi network is not possible.

Once you have created an account log in and tap on the plus symbol in the middle of the screen, if this is the first device being added, or on the plus symbol in the top right if the account already has devices registered.

- From the list of available devices under the D-D H2Ocean heading select 'KH Manager'.
- The Bluetooth connection page will initially appear, tap on the serial number and icon relating to your device.
- Select your home Wi-Fi network from the available list, carefully enter your password, and tap 'Next'.
- Connection to the KH Manager will begin, once complete the app will advise of 'Successful Connection' and prompt to press 'Start To Use'. A white Wi-Fi symbol will be displayed on the KH Manager's LCD screen to confirm the device is online.

To enter the settings pages for the unit, tap on the KH Manager icon with the serial number corresponding to your unit and you will enter the settings page.

DIRECT BLUETOOTH CONNECTION TO THE KH MANAGER

Direct connection to the KH Manager is possible if a suitable Wi-Fi network is not available for the cloud connection above. Please note some features of the KH Manager are not available in this mode and you will need to be within Bluetooth range of the device for a connection to be made.

Ensure that power is switched on to the KH Manager, that permissions for the Kamoer Remote app are **set to ON and that Bluetooth is active on your mobile device.**

- If you are logged into your Kamoer Remote account switch to the offline mode by tapping on the icon in the top left corner, select ‘Offline Control’ from the list.
- Then from the drop down menu at the top of the page, switch from ‘LAN Mode’ to ‘Bluetooth Mode’. If you are not logged in to a Kamoer Remote account it is possible to select ‘Offline Control’ from the bottom of the login screen and then switch to Bluetooth mode as above.
- The Kamoer Remote app will automatically scan for any available D-D and Kamoer Bluetooth devices displaying them on the screen. Tap on the KH Manager icon with the serial number corresponding to your unit and you will enter the settings page for that unit.

STARTING THE KH MANAGER

IN APP STEP BY STEP GUIDE

After the initial connection has been made and you enter the settings pages a step-by-step guide will be displayed in the Kamoer Remote App. This guide will go through the process of commissioning the unit, calibrating the pH probe and the pump heads. It is recommended to follow this guide, but it is possible to skip this by selecting ‘Skip’ in the top right corner if you want to manually go through each individual calibration element. Access to this step-by-step guide is also available by selecting the ‘settings’ icon from the bottom right, when in the control pages for the KH Manager, and then ‘Guide’ once in the settings page. Information on calibrating specific components is described below section ‘CALIBRATION’, **the unit must be calibrated properly before use.**

INSTALING THE FRONT HOUSING

Once the KH Manager has been fully calibrated using the in-app step-by-step guide or following the processes below in the section ‘CALIBRATING THE KH MANAGER’ the test beaker, probe and front housing can be installed.

- Place the stirring bead into the glass beaker.
- Stand the glass beaker in the base of the unit making sure both the long and the short tube are sitting inside the beaker and that the spout is facing towards the back. The long tube should be sitting close to the side and touching the bottom.
- Check that the dripper nozzle for the KH Reagent is sitting correctly, with the base of the pointed tip sitting in its holder and the end in the locating groove, so that the reagent drips will fall between the black optical sensors.
- Thread the pH probe through the hole in the top of the front plastic cover and feed the excess cable into the hollow section to the left leaving some slack.
- Leaning the top front edge of the plastic cover forwards sit the end of the probe in the beaker and then slide the front cover in to position carefully to avoid trapping or pinching the pH probe cable.
- Adjust the position of the pH probe so that it is sitting upright in the front cover and the tip is just above the height of the stirring bead.

The unit should now be ready to perform a test, it is recommended to perform a manual test at this stage to confirm the operation of the unit and to check that all is calibrated correctly. If setting up

the unit for the first time follow the below instructions for mixing the KH test reagent before proceeding.

MIXING THE KH TEST REAGENT

The KH Manager includes a 20ml bottle of standard concentrated reagent, this will make 1000ml of solution when mixed with pure water. Additional reagent is available separately from your retailer either as this standard concentrate 20ml bottle or as a double strength concentrate in larger sizes.

To mix the reagent please follow the below steps. It is important that the reagent is mixed carefully and is not contaminated, failure to mix the reagent properly will give incorrect test results.

- Remove the protective plastic covers from the digital scales.
- Place the digital scales on a stable, flat and level surface then power on.
- Switch the scales to read in grams by depressing the mode (M) button until 'g' is shown.
- Sit a suitable clean empty container on the weighing platform that has a useable volume of 1000ml or greater.
- Press the Tare button (T) to zero the scales.

Mixing the 20ml bottle of standard concentrate reagent (Supplied with the unit).

- Weigh out exactly **980 grams** of pure water (RODI).
- Add the complete **20ml** bottle of standard concentrate reagent.
- Gently mix the solution.

Mixing the double strength concentrate reagent.

- Weigh out exactly **990 grams** of pure water (RODI).
- Add **10ml** bottle of double strength concentrate reagent.
- Gently mix the solution.

When the KH Test Reagent has been mixed, log in to the Kamoer Remote app and tap on the device icon for your KH Manager. The 'Status page' for the device should be displayed, if not tap on the status icon in the bottom left, on this page it will show the volume trackers for the reagents. Tap on the tile titled 'KH Test Reagent' and then select 'Modify Directly', enter the volume of reagent you have mixed in ml. Once done tap 'save' in the top right corner and then the blue arrow in the top left to return to the status page.

It is advisable to gently stir the reagent once a week to ensure the concentration remains constant.

CHECKING THE KH TEST REAGENT

The KH Manager has a built-in function to check that the test reagent has been mixed correctly and is good to use. It is important that freshly made reagent is left to warm up to 25^{0}C before performing this check and that the pH probe has been accurately calibrated.

Please note: if the KH Manager is set to run automatic plans it will disable these plans when you enter the 'Maintain' heading to perform this check, a pop up will appear on screen to confirm, select 'Go' to continue or 'Cancel' to exit. After you exit the maintenance page automatic testing will be resumed as before.

To check the reagent, log into the Kamoer Remote app and tap on the device icon for your KH Manager. Select the settings icon in the bottom left, when the settings page is displayed tap on 'Maintain' followed by 'Availability of "KH Test Reagent"'. Then carefully decant enough KH test reagent into the glass beaker, or suitable clean dry vessel, to cover the bottom inch of the pH probe. Rince the end of the pH probe in some RO water and carefully dry with some soft paper towel, stand the probe in the test reagent sample and allow to settle for two minutes. After this time, in the app, tap on the small circle on the screen next to 'I have let it settle for 2 minutes' to confirm the probe is ready and then select 'Check' at the bottom of the screen to begin. After a few second a pop up will appear on the screen showing either 'Reagent Available' if it is good to use or 'Reagent Unavailable' if the reagent is out of the acceptable range for performing an accurate test, tap 'ok' to confirm and then the blue arrow in the top left corner to exit the 'Maintain' screen.

If the reagent is out of the acceptable range for use it should be safely discarded and a fresh solution made.

PERFORMING A TEST

SETTING THE ALERT THRESHOLD FOR KH AND PH

An upper and lower acceptable range for KH and pH can be programmed into the KH Manager. This is used so that the machine can alert you if the test result falls outside your desired parameters. To set you desired range for both parameters log into the Kamoer Remote app and tap on the device icon for your KH Manager. Select the 'Settings' icon from the bottom right of the screen and then 'Threshold' from the list shown on the 'Settings' page. The 'Threshold' page will display the range that has been set for the KH and pH, to modify these select the parameter you want to modify, tap on the existing number and enter the new value. It is normal to have some variation in a reef aquarium so it is best not to set the range to tight, i.e. if the desired KH level is 7.5, set the range 7.1-7.9 equally if the aquariums pH is known to range from 7.9 to 8.3 between day and night cycles set the alert to 7.8-8.4.

TESTING

The KH Manager is capable of performing one off manual tests or can be set to automatically perform up to 24 tests per day. Both test modes have the option to trigger the addition of a KH buffer solution or just report a test result. The front digital display of the machine will display the current test mode, either 'Manual' or 'Automatic'.

PERFORMING A MANUAL TEST

Before performing a manual test make sure that the unit is fully set up and calibrated as per the above instructions then log into the Kamoer Remote app and tap on the device icon for your KH Manager.

The app should be displaying the 'Status' page, if not tap on the 'Status' logo in the bottom left corner, the top the status page will show the last test result for KH and pH with either 'Keep KH' or 'Tank Volume' below. If 'Keep KH' is displayed with 'OFF' to the right of it the KH Manager will not add KH buffer solution after the test, if 'Tank Volume' is displayed then an automatic addition of KH buffer solution will be added after the test as per the settings. To turn off the automatic dosing, tap on 'Tank Volume' then tap on the toggle in the top right corner next to 'Keep KH' to move it to the off position, once done select the blue arrow in the top left to exit and return to the status page, 'Keep KH' and 'OFF' should now be displayed.

It is advisable to make sure that automatic dosing of KH buffer solution (Keep KH) is turned off if you are just checking the function of the unit or do not want to make an adjustment to the KH level of the aquarium at this stage.

For information on setting the KH Manager for automatic KH Buffer solution addition please see the section below titled 'AUTOMATIC ADDITION OF KH BUFFER SOLUTION'.

At the bottom of the screen, in the app, tap on the 'Test' icon to enter the 'Test' page and settings. The page will either display 'Manual' in the top left or 'Automatic', if it is displaying 'Automatic' tap on the blue downwards arrow and select 'Manual test' from the pop up at the bottom of the screen.

Next select the menu icon in the top right to enter the settings for the test, this page will display the option for the number of times the beaker will be rinsed before performing a test and the amount of sample water used for the test. It is suggested that the beaker is rinsed 2-3 times for accurate results, however if a slight margin of error is allowed and it is preferred that the amount of waste water produced is reduced then it can be set to a single rinse cycle. To adjust this tap on 'Times of Rinsing Beaker', enter the preferred number of rinses (can be between 1 and 10) then select save in the top right to confirm.

As default the KH Manager is set with a test sample volume of 50ml, this volume is large enough to provide accurate results without using excessive KH test reagent per test cycle. It is however possible to increase the amount of sample water used up to a maximum of 100ml, using a larger sample volume will decrease the possible margin of error but can significantly increase the volume of reagent used and will create more waste water per test cycle. If increasing the test sample volume a larger 150ml glass test beaker will need to be obtained. To alter the volume tap on 'Amount of Test Saltwater' enter the preferred volume (can be between 50 and 100ml) then select save in the top right to confirm.

Exit the test settings by tapping the blue arrow in the top right corner.

When ready to initiate a test tap 'Start' in the middle of the screen. A bar will appear at the bottom of the screen showing the progress of the test cycle and the current operation it is performing.

After the beaker has been flushed and rinsed as per the settings the KH Manager will take the clean test sample and perform a pH test, this will display on the screen of the machine. Following this a number of cycles automatically stirring the sample whilst adding the reagent will commence, the KH reading displayed on the front of the machine will start to increase from zero until the end result is reached.

The end result will be displayed on the screen at the front of the KH Manager and in the Kamoer Remote app pages for the unit if connected to the cloud via Wi-Fi. The words 'Low', 'High' or 'Normal' will also be shown to indicate if the result is below, above or within the target range that has been set. If the result is low and the automatic addition of KH buffer solution has been set to **on** the machine will automatically dose as per the programmed parameters to increase the KH of your aquarium to the set point you have chosen.

PERFORMING AN AUTOMATIC TEST

Before performing an automatic test make sure that the unit is fully set up and calibrated as per the above instructions then log into the Kamoer Remote app and tap on the device icon for your KH Manager.

The app should be displaying the 'Status' page, if not tap on the 'Status' logo in the bottom left corner, at the top the status page will show the last test result for KH and pH with either 'Keep KH' or 'Tank Volume' below. If 'Keep KH' is displayed with 'OFF' to the right of it the KH Manager will not add KH buffer solution after the test, if 'Tank Volume' is displayed then an automatic addition of KH buffer solution will be added after the test as per the settings. To turn off the automatic dosing, tap on 'Tank Volume' then tap on the toggle in the top right corner next to 'Keep KH' to move it to the off position, once done select the blue arrow in the top left to exit and return to the status page, 'Keep KH' and 'OFF' should now be displayed.

It is advisable to make sure that automatic dosing of KH buffer solution is turned off if you are just checking the function of the unit or do not want to make an adjustment to the KH level of the aquarium at this stage.

For information on setting the KH Manager for automatic KH Buffer solution addition please see the section below titled 'AUTOMATIC ADDITION OF KH BUFFER SOLUTION'.

At the bottom of the screen, in the app, tap on the 'Test' icon to enter the 'Test' page and settings. The page will either display 'Manual' in the top left or 'Automatic', if it is displaying 'Manual' tap on the blue downwards arrow and select 'Automatic test' from the pop up at the bottom of the screen.

Next select the menu icon in the top right to enter the settings for the test, this page will display the option for the number of times the beaker will be rinsed before performing a test, the amount of sample water used for the test and the options to set an automatic re-test if the result does not match the trend of the previous KH test or falls outside your set KH threshold range.

It is suggested that the beaker is rinsed 2-3 times for accurate results, however if a slight margin of error is allowed and it is preferred that the amount of waste water produced is reduced then it can be set to a single rinse cycle. To adjust this tap on 'Times of Rinsing Beaker', enter the preferred number of rinses (can be between 1 and 10) then select save in the top right to confirm.

The re-test function allows the KH Manager to perform a second test to confirm the result if the KH reading from the completed test varies too much from the last, this trigger point is user defined. For example, the last test gave a result of 7.5dKH and you have set a trigger point of 1.0dKH if the next test is above 8.5dKH or below 6.5dKH it will ignore the result and start another test to confirm if the reading was correct or not. If the end reading is still outside the trigger range the KH Manager will alert, if it is within the trigger range it will return to normal operation. To activate this function, select 'Retest' in the 'Test Settings' page then tap on the toggle in the top right to switch on. Set the trigger point by tapping on the box labelled 'Trigger' and enter the desired value. To turn the function off tap the toggle again and 'Off' will be displayed to indicate it is not active. Select the blue arrow in the top left corner to return to the test settings page.

KH abnormality function can be set to increase the test frequency if the results fall outside the user defined threshold. For example, you have a KH threshold set of 7.2-7.8dKH and are testing every 12 hours, if the test result gives a reading of 7.0dKH the KH Manager will increase the frequency of the tests to every 2 hours until the result is back above 7.2dKH. To set this function select 'KH Abnormality Test' in the 'Test Settings' page then tap on the toggle in the top right to switch on. Set the frequency to test by tapping on the box labelled 'Test Interval' and choose to re-test every 1,2,3 or 4 hours then tap on the blue arrow in the top left to exit. To turn the function off tap the toggle again and 'Off' will be displayed to indicate it is not active. Select the blue arrow in the top left corner to return to the test settings page.

As default the KH Manager is set with a test sample volume of 50ml, this volume is large enough to provide accurate results without using excessive KH test reagent per test cycle. It is however possible to increase the amount of sample water used up to a maximum of 100ml, using a larger sample volume will decrease the possible margin of error but can significantly increase the volume of reagent used and will create more waste water per test cycle. If increasing the test sample volume a larger 150ml glass test beaker will need to be obtained. To alter the volume tap on 'Amount of Test Saltwater' enter the preferred volume (can be between 50 and 100ml) then select save in the top right to confirm.

Exit the test settings by tapping the blue arrow in the top right corner.

The KH Manager has four pre-set times in automatic mode so the machine will perform a test every 6 hours. These can be removed, added to, or adjusted if required.

- To adjust the time of a programmed test, tap on the time and then use the scroll wheel that appears to enter a new time, when done select 'Save' in the top right corner.
- For adding a new plan tap on the plus symbol towards the top right corner of the automatic test page, select the time of the new plan, and then choose 'Save' in the top right corner.
- Plans can be deleted by either swiping the plan to the left in the automatic test page and tapping the red delete box or by tapping on the plan and selecting 'Delete', then confirming by choosing 'Delete' in the pop-up that appears at the bottom of the screen.

Please note a maximum of 24 tests can be set in a 24 hour period with a minimum gap of 60 minutes between each test.

It is also possible for the machine to only carry out the test programs on certain days of the week or every number of 'X' days. The current setting is displayed at the bottom of the automatic test page screen under 'Cycle Date'. To change the days the KH Manager will perform tests select 'Cycle Date' at the bottom of the screen. A pop-up will appear with the options 'By Days' and 'Weekly'.

- Select 'By days' to set the tests every 'x' days, i.e. if set to 2 then the machine will perform the tests every 2 days. Choose the frequency using the scroll wheel at the bottom of the page and then tap 'Save' in the top right corner.
- Select 'Weekly' to choose the days of the week the KH Manager will perform the tests, i.e. you could choose only to test on a Monday, Wednesday, and Friday. Tap on the circle to the right of each day to select or de-select it, any days showing a corresponding highlighted circle with a tick in it are the days it will test. Once done tap 'Save' in the top right corner.

On the automatic test page, above the plan times, there is a box that will be displaying either 'Testing Plans : OFF' or 'Testing Plans : ON'. When 'OFF' all the programming will remain stored but the machine will not run, if 'ON' the programs will be active and the KH Manager will test as set. To switch between on and off tap on the toggle switch to the right, when the toggle is highlighted it will switch to on and when grey it will be off. The off function can be used during machine or aquarium maintenance to deactivate it without losing any settings.

An immediate test function is also available when the KH Manager is in automatic mode. This will allow a one-off test without having to switch the machine to manual mode or alter any settings, when the test is complete it will return to automatic testing as set. To perform an immediate test, select 'Test Now', located under the list of plan times in the automatic test page, then confirm by tapping on 'Test' in the pop-up that appears at the bottom of the screen. To cancel and exit tap on the screen anywhere above the pop-up.

Please note: An automatic test will be skipped if an immediate test overlaps its start time or you are in the 'Maintain' section within the main settings tab, the next test program will continue as normal.

DATA LOGGING AND MONITORING

If your KH Manager is registered to an account on the Kamoer Remote app and connected to the cloud via Wi-Fi it will record data after each test. Data is collected on the KH test results, pH of the tank water sample, time the test was completed, the test mode used and depending on the dosing mode how much KH Buffer solution is added (If automatic dosing is activated using the KH Manager).

To view the collected data, log into the Kamoer Remote app and tap on the device icon for your KH Manager, then select the 'Data' icon from the bottom of the screen. The page will display a graph plotting the results from each test at the top and a data list below.

Two separate data pages are available one for KH and one for pH. To select the data you would like to view tap on either the KH or pH heading at the top of the data page, a bar highlighting the data you are viewing will be shown underneath the KH or pH heading.

The graph can display the data for the past week or the past month. Above the graph itself there are two tabs showing ‘Week and ‘Month’, to switch between the views tap on the option you want to select, the selected tab will be highlighted.

It is also possible to jump back or forwards in weeks or months, depending on the graph view chosen. Under the graph a date box is shown, tapping on the black arrows to the left or right of this box will jump the view back or forwards (if you are viewing the current week/month the right arrow to jump forwards will not be displayed). The date box will automatically change to display the last date shown on the graph, this will also correspond to the data list at the bottom of the page. If you place your finger on the graph and follow the line you can view individual data points.

To find or view the data for a specific date tap on the date box under the graph, choose a date from the scroll wheel that appears at the bottom of the screen and then tap ‘Done’. The graph will automatically change to the week or month corresponding to that date and the data list will show the test results from that day.

SETTING THE REAGENT AND WASTE WATER MONITORING

The KH Manager can automatically monitor the availability of KH buffer solution and KH test reagent, as well as the amount of wastewater produced. These are all displayed within the device ‘Status’ page in the Kamoer Remote app.

To enter the status page for your device, log in to the Kamoer Remote app and tap on the device icon for your KH Manager. The status page should be displayed, if not tap on the ‘Status’ icon in the bottom left corner.

A tile will be shown for the KH buffer solution (KH Rise Reagent) and the KH test reagent that displays the amount of liquid available, the starting volume, and an icon giving a visual representation with the percentage of liquid remaining. This icon changes as the volume of liquid reduces and an alert will be sent when there is 10% remaining if notifications are set.

For the KH buffer solution, tap on the tile titled ‘KH Rise Reagent’ and then enter the volume of reagent you have available in ml. Once done tap ‘save’ in the top right corner and then the blue arrow in the top left to return to the status page.

To adjust the amount of liquid available for the KH test reagent tap on the tile titled ‘KH Test Reagent’ and select ‘Modify Directly’, then enter the volume of reagent you have mixed in ml. Once done tap ‘save’ in the top right corner and then the blue arrow in the top left to return to the status page.

The tracking for a wastewater container can be turned on or off, depending on if a wastewater container is being used. If this function is active the tile titled ‘Wastewater’ will show the volume of liquid that has been sent to waste (from testing and flushing the unit), the total volume that is available in the container and a visual representation with the percentage space remaining. This icon changes as the volume of liquid increases and an alert will be sent when the container is 90% full if notifications are set. If the function is de-activated the ‘Wastewater’ tile will just display ‘OFF’ on the right-hand side.

To enter the settings for this function or to turn it on or off tap on the ‘Wastewater’ tile, if it is off ‘Display Status’ will be shown on the screen with a grey toggle switch to the right. When the function

is on, the toggle switch will be highlighted and you will see 'Volume of Container' and 'Clear Wastewater' displayed. Tapping on the toggle switch will turn the function on and off.

If the wastewater monitoring is to be used enter the settings and turn the feature on as above. Input the volume of the container you have to collect the wastewater by tapping on 'Volume of Container' and enter the available volume in ml, tap done, and then select 'Save' in the top right corner, to exit without making a change select 'Cancel' in the top left corner. The option to 'Clear Wastewater' should be used to reset the volume of the container monitoring in the app to empty when you dispose of the contents of the actual wastewater container. To do this tap on 'Clear Wastewater' and then select 'Clear' from the popup at the bottom of the screen, to cancel without resetting the volume tap 'Cancel'.

AUTOMATIC KH BUFFER DOSING

The KH Manager has a dedicated stepper motor driven pump built-in to automatically add a KH buffer solution based on the test results. This function can be switched on and off independently of the test function depending on whether you want to use it or not.

Expansion of the KH Manager for additional dosing options is possible by connecting up to two D-D P4 or P4 Pro dosing pumps or a Kamoer FX-STP stepper motor pump via E1 communication box (available separately). Instructions for this and the setting is shown in the separate 'KH Manager Expansion' instructions.

There are two options that can be used, 'Auto add' and 'Custom Plans'

ACTIVATING AND DEACTIVATING AUTOMATIC KH DOSING

NOTE: The KH rise pump (KH SOLUTION IN) must be calibrated correctly, as described in this instruction manual, before activating this mode.

To turn automatic dosing on or off, first log in to the Kamoer Remote app and tap on the device icon for your KH Manager. The status page should be displayed, if not tap on the 'Status' icon in the bottom left corner.

The top tile on the page will display 'Keep KH' followed by 'OFF', if automatic dosing is switched off, if however, 'View plans of adding KH rise reagent' and 'Tank Volume' are displayed then this function is already switched on.

To switch the function tap on 'Keep KH' if you are turning it on or 'Tank Volume' if you are turning it off, this will take you to the 'KH Status' page. At the top of this page is 'Keep KH' with a toggle switch to the right, tap on this toggle switch to switch the function on or off.

When the machine has the automatic KH dosing active the 'KH Status' page will also show the basic information needed to use this function, 'KH Balance Value' and 'Tank Volume'. The KH balance value is the target KH value that you want your aquarium to be maintained at, to change this simply tap on 'KH Balance Value' enter the new value (in dKH) on the number pad that appears and confirm by selecting 'Ok' if you want to exit without changing the value choose 'Cancel'. **The tank volume is used by the KH Manager in the automatic calculation to work out the amount of KH buffer**

needed, so it is crucial that this is entered correctly. To set this tap on 'Tank Volume' enter the new value (in litres) on the number pad that appears and confirm by selecting 'Ok', if you want to exit without changing the value choose 'Cancel'.

Tracking is also shown on this page for water that has been used for the testing process, under the heading 'Seawater Used', this is purely a tracking element and can be viewed for reference. If at any point you want to clear this tracking element and set it back to zero tap on 'Seawater Used' followed by 'Recalculate' in the pop-up that appears at the bottom of the screen, if you want to exit without clearing select 'Cancel'.

SETTING AUTO ADD MODE

After each KH test in this mode the machine will calculate how much KH buffer solution will need to be added to raise the level in your aquarium to the set point. For example if your KH set point (KH Balance Value) is 7.5dKH and the test has a result of 7.3dKH then enough KH buffer will be added to raise your aquarium by 0.2dKH. If the result is on or higher than your set point, then no buffer will be added.

To activate and set this mode go to the 'KH Status' page as described above under the heading 'ACTIVATING AND DEACTIVATING AUTOMATIC KH DOSING', then select 'Add KH Settings'. The next screen will show different device options for adding the KH buffer, choose 'Use "KH Carer" to add'. This will take you to the settings page for dosing using the KH Manager, at the top 'Auto Add' or 'Custom Plans' will be displayed. If 'Custom Plans' is shown, tap on the blue downwards facing arrow at the end of the heading and select 'Auto Add' from the pop-up that appears on the bottom of the screen.

The settings on this page let you determine limitations on how much KH buffer solution can be added and how the machine doses the buffer solution.

Total add cap: This is the maximum total amount of KH buffer that the machine will be allowed to dose after a test. If the KH value in the aquarium has dropped significantly for some reason this will prevent too much buffer solution from being added in one go and allow the levels to be returned to normal gradually.

Generally, we would suggest that the KH elevation per day is limited to 0.5dKH, to accurately calculate the figure to set on an established aquarium you will also need to take into account the amount of KH buffer your aquarium will normally use per day. So for example if the KH Manager is performing 4 tests per day, it takes 10ml of KH buffer to raise your aquarium by the 0.5dKH limit and you normally add 10ml daily to the aquarium to maintain the KH level the total add cap should be set to 5ml (20ml ÷ 4 tests = 5ml). To adjust the amount, tap on 'Total Add Cap', then on the white box at the top of the page, enter the amount in ml followed by 'Done', finally tap save in the top right corner to confirm and return to the settings page.

Single add cap: The KH Manager can break up the calculated automatic dose into smaller amounts to reduce the risk of precipitation and give a more gradual correction to the KH level in the aquarium. For example, the machine has calculated that it needs to add 4ml of KH buffer solution after a test to correct the KH level, if you have the single add cap set to 1ml then it will add four doses of 1ml (1 + 1 + 1 + 1 = 4ml). The gap between the doses is determined by the KH interval described in the next paragraph. If the dose amount needed does not work out exactly as the

example above then it will dose the single add cap amount for each dose and then the last will be the remainder to make up the exact amount needed.

Add KH interval: The gap between each automatic dose of KH buffer is determined by the 'Add KH Interval' setting, if the amount needed is greater than the single add cap. This setting can be used to spread dosing out between tests, it should be noted that enough time needs to be allowed between the last dose and the next test for the KH buffer to have mixed fully through the system and taken effect.

For example, if using the information in the examples above, you are performing 4 tests a day (one test every 6 hours), the total add cap is 5ml and the single add cap is 1ml. From the information the maximum amount of times it could possibly dose is 5 times (1ml + 1ml + 1ml + 1ml + 1ml = 5ml), the goal will be to spread this out between the last test and the next test. The KH Manager will take approximately 25-30 minutes to perform a complete test cycle so there are 5 hours 30 minutes (330 minutes) to complete the dosing as it is testing every 6 hours. If the add KH interval is set to 60 minutes it can perform the 5 doses and still allow 30 minutes for the KH level to adjust before the next test (5 x 60 minutes = 300 minutes).

To set the interval tap on 'Add KH Interval', then select the white box at the top of the page, enter the amount in minutes followed by 'Done', finally tap save in the top right corner to confirm and return to the settings page.

KH Buffer Concentration: It is possible to use different brands of KH buffer solution with the KH Manager. For this to work correctly you need to program the concentration of the solution you are using into the machine. To do this tap on 'KH Rise Reagent Brand', in the next page there are two options 'Kamoer' and 'Other' if you are using Kamoer's KH buffer then the strength is already programmed into the machine, simply tap on 'Kamoer' so that the blue tick is shown next to 'Kamoer', then select 'Save' in the top right corner. If you are using another brand tap on 'Other' to select it and then enter the details of the buffer solution in the boxes below under the heading 'Set Concentration of Reagent'. These details are usually displayed on the product bottle. To change each value, tap on the box in the app to bring up the keyboard, carefully enter the amount, then select done. Once the values are set select 'Save' in the top right corner to save and return to the settings page.

Once all the settings are completed tap on the blue arrow in the top left corner to exit.

SETTING CUSTOM PLAN MODE

In this mode a user defined program is set up that the KH Manager follows, in the same way a programable dosing pump is used. However, if set, the machine can automatically vary the dose based on the test results to combat under or over dosing. This mode is useful if the KH consumption of the tank is constant and known. For example if you need to add 12ml of KH buffer solution to your aquarium each day, on average, to maintain a constant KH level you can set up a program telling the machine to add 0.5ml every hour throughout the day, if the automatic KH tests indicate the KH is starting to creep up then the machine will automatically decrease the 0.5ml dose, if the KH is starting to fall it will automatically increase the amount being dosed. The programming that the machine uses to work out the variance is user defined and can be done based on a percentage or volume.

To activate and set this mode go to the 'KH Status page as described above under the heading 'ACTIVATING AND DEACTIVATING AUTOMATIC KH DOSING', then select 'Add KH Settings'. The next screen will show different device options for adding the KH buffer, choose 'Use "KH Carer" to add'. This will take you to the settings page for dosing using the KH Manager, at the top 'Auto Add' or 'Custom Plans' will be displayed. If 'Auto Add' is shown, tap on the blue downwards facing arrow at the end of the heading and select 'Custom Plans' from the pop-up that appears on the bottom of the screen.

Setting the plan: Setting of the main dosing plan is similar to the programming used on the D-D dosing pumps.

- Start by adding a group, this lets you name the group of programs and the time period that the group is active. Tap on '+ New Group' to start, enter a name by selecting the white box labelled 'Name', enter the chosen group name followed by 'Done'. After this tap on 'Time' and use the scroll wheel that appears to set a start and end time for the program group, to confirm tap 'Done'. When completed select 'Save' in the top right corner. The app will return to the custom plans page.
- A tile showing the plan group you have just set up will be displayed on the screen, tap on the blue arrow in the bottom right corner of your plan group tile to expand it and show the options 'Add a Plan' and 'Quick Add'.

  Add a plan: This option will allow you to add single plans at a time without adjusting others that are already set. Tap on the 'Add a Plan' tab and then enter a time for the plan to start by selecting 'Start Time', use the scroll wheel to set the time and then save by selecting 'Done', next tap on 'Add' to enter the amount of solution you would like to add at the time you have just set, tap on the white box at the top of the page that appears, enter the volume in ml, select done and then save in the top right corner. Check the time and dosing volume are correct, then save in the top right corner. The plan you have created will now show in the group, these steps can be repeated to add more plans if needed.

  Quick add: If you are adding multiple plans this is the quickest option, please note using this will overwrite any existing plans in the group. Tap on the 'Quick Add' tab to begin, a prompt will appear on the screen to warn that proceeding will replace any existing plans, choose 'Ok' to continue or 'No longer Prompt' to dismiss the warning permanently.

  - Tap on 'Add times' and then set the number of doses you would like to have in the group on the scroll wheel that appears at the bottom of the screen, select done to set.
  - To enter the total amount of KH buffer solution you would like to add select 'Total Add', tap on the white box at the top of the page that appears, enter the volume in ml, select done and then save in the top right corner.
  - Set the anti-chemical interference, if needed, by selecting the heading 'Anti-chemical Interference' and choosing a time on the scroll wheel that appears at the bottom of the screen, then select done to set.
  - A plan preview is available by tapping on the toggle switch to the right of the heading 'Plan Preview'.
  - When the settings are complete tap 'Save' in the top right corner to save and return to the custom plans page.

For each group the individual plans can be viewed or hidden by tapping on the blue arrow in the bottom right of the group tile. Swiping the individual plan or group to the left will delete it, and tapping on them will allow you to make amendments. More than one group of plans can be added as long as the selected times do not overlap, so for example you could set a day time plan group and a night time plan group.

Setting the adjustment parameters: Select 'Adjust KH' from the bottom of the custom plan page, this will take you to the adjust KH settings page.

Note: Automatic adjustments to the dosing schedule will not be active until a test is performed, triggering the function. A warning '"Adjust KH" is ineffective temporarily until complete a KH test' will be displayed at the bottom of the 'Adjust KH' page.

- **Range:** The KH Manager will only make automatic changes to the dosing if the dKH result from the test is within a certain range of your KH set point (KH Balance Value), this range can be programmed to be +/- 0.1 to 1dKH. For example if your KH set point is 7.5 you can set the machine so that automatic adjustments are made if the dKH tested by the machine is between 6.5 and 8.5dKH. To Modify the range select 'Range' in the adjust KH settings page, tap on the lower and upper parameters to make adjustments, enter the figure then select 'Done' and 'Save' in the top right corner to save and exit.
- **Method:** This is used to determine if you would like the KH Manager to use an amount or percentage proportion when making the adjustments to the dosing schedule, this adjustment can be made to effect a single dose on the schedule or multiple doses to spread and reduce the change in addition. The method currently in use is shown to the right of the method heading. To change the settings on this or swap between percentage proportion and amount tap on the 'Method' heading and then select either 'Proportion' or 'Amount' from the pop-up that appears at the bottom of the screen, if you want to exit without making a change select 'Cancel'.

    - **Proportion** is expressed as a percentage per dKH.
    - **Amount** is expressed as an amount in ml per dKH.

- **Adjust Times:** Use this to set how many of the plans in the group are adjusted using the 'Proportion' or 'Amount' methods. If only one plan is adjusted the adjustment is greater than if multiple plans are adjusted.
- **Stop Adjusting:** If you want to stop the KH Manager making adjustments to the plans until the next KH test is completed, tap on 'Stop Adjusting' followed by 'Stop' in the pop-up that appears at the bottom of the screen, to exit without stopping the adjustments select 'Cancel'. After the next test the machine will resume making adjustments as programmed.

CALIBRATING THE KH MANAGER

ENTERING THE CALIBRATION SETTINGS

To enter the calibration settings log into the Kamoer Remote app and tap on the device icon for your KH Manager. Select the settings icon in the bottom left, when the settings page is displayed tap on 'Maintain' followed by 'Calibration'. In this page you can enter the calibration settings for the individual components or reset the calibration of the unit to factory default.

Please note: if the KH Manager is set to run automatic plans it will disable these plans when you enter the 'Maintain' heading, a pop up will appear on screen to confirm, select 'Go' to continue or 'Cancel' to exit. After you exit the maintenance page automatic testing will be resumed as before.

CALIBRATING THE PH PROBE

Go to the calibration settings in the Kamoer Remote app and select 'pH' from the common list. The 'pH Calibration' page will show you details of when the probe was last calibrated, when the next calibration is due (this is a user defined setting), the current pH slope and the option to 'Go to calibrate'.

- To begin tap on 'Go to calibrate' in the app and choose if you would like to use pH9.18 and pH4 solutions (supplied with the KH Manager) or pH7 and pH4 solutions depending on what you have available. **Please note the pH calibration solutions will need to be at 25^{0}C for correct calibration**.
- Make sure you have the items needed to perform the calibration, the two Calibration solutions, some pure water (RODI) for rinsing the probe, and some soft paper towel.
- If present remove the protective cap from the pH probe by unscrewing the pot section and then sliding the seal and cap off the end of the probe. Care must be taken not to damage the tip of the probe.
- When prepared tap 'I'm ready' in the app.
- Gently rinse the tip of the probe in some pure water and then gently dry with some paper towel. Place the probe in the first calibration solution and gently shake to remove any bubbles, as displayed on the screen in the app. The bottom inch of the probe should be submerged in the solution and be allowed to sit for 2 minutes to settle.
- After 2 minutes tap 'Calibrate' at the bottom of the screen in the app, calibration will begin, once completed the app will display the successful calibration and prompt to go to the next calibration point, tap 'Go to "pH4 Calibration"' to continue.
- Gently rinse the tip of the probe in some pure water and then gently dry with some paper towel. Place the probe in the pH4 calibration solution and gently shake to remove any bubbles, as displayed on the screen in the app. The bottom inch of the probe should be submerged in the solution and be allowed to sit for 2 minutes to settle.
- After 2 minutes tap 'Calibrate' at the bottom of the screen in the app, calibration will begin, once completed the app will display that the process is complete.
- Tap ok at the bottom of the screen to confirm and save.

The app will return you to the pH Calibration page after the above steps are completed. It is advisable to set the reminder for periodically calibrating the probe, to do this tap on the box

displaying the ‘Last Time’ and ‘Next Time’, enter the number of days, then save in the top right corner. For accurate testing it is suggested for this to be set to 30-45 days, after this time has elapsed a warning will appear on the screen in the app to remind you that calibration is due.

To exit tap the blue arrow in the top left.

The end of the pH probe should not be allowed to dry fully. If the probe is not in use or being stored the protective cap should be replaced with enough probe storage solution in it to cover the end. If the probe is removed from the machine during maintenance or whilst calibration of other components is taking place it can be carefully stood in a small amount of aquarium water or the probe cap replaced as above. Never use pure water (RODI) to store the pH probe.

CALIBRATING THE SALTWATER PUMP (TANK WATER IN)

Go to the calibration settings in the Kamoer Remote app and select ‘Saltwater Pump’ from the common list. The ‘Saltwater Pump Calibration’ page will show you details of when the pump head was last calibrated, when the next calibration is due (this is a user defined setting), the current head calibration data and the option to ‘Go to calibrate’.

- To begin tap on ‘Go to calibrate’ in the app.
- Make sure you have the glass beaker and digital scales ready to perform the calibration, remove the front cover from the KH Manager by pulling it forwards exposing the tubes.
- When prepared tap ‘I’m ready’ in the app.
- Place the glass beaker in the base of the unit under the short tube that is on the far right as you look at the unit.
- In the Kamoer Remote app tap on the ‘Run’ button to start the pump head and flush the tubing. Once water is flowing into the glass beaker and there are no air bubbles tap the ‘Stop’ button.
- In the app add a run time for the pump calibration by tapping on the number under ‘Input add time’, it is recommended that the longest available time of 60 seconds is used for the most accurate calibration.
- Select ‘I’ve finished setting’ at the bottom of the screen to continue.
- Place the digital scales on a stable, flat and level surface then power on.
- Switch the scales to read in grams by depressing the mode (M) button until ‘g’ is shown.
- Remove the glass beaker from the KH Manager and empty out any liquid, then place the empty glass beaker on the scales.
- Press the Tare button (T) to zero the scales and compensate for the weight of the glass beaker then select ‘I’ve tared’ at the bottom of the screen in the app.
- Leave the scales on and remove the glass beaker, the display will show the weight of the beaker as a minus number.
- Place the glass beaker back in the base of the unit under the short tube that is on the far right as you look at the unit.
- In the app tap ‘Start adding’ to begin running the pump, the screen will show a countdown in seconds as the pump runs.
- Once the pump stops running tap ‘Add ended’ at the bottom of the screen.

- Put the glass beaker back on the scales, make sure the minus weight is still displayed before placing the beaker. This will give you the weight of the water minus the glass beaker.
- Enter the weight given on the scales into the app. The specific gravity of the water will need to be known to complete this step. The app automatically uses an SG value of 1.022, if the water that has been weighed differs from this then the correct value will need to be entered. To do this tap on 'modify "SG"', enter the actual value and then select save in the top right corner.
- Finish the calibration by tapping 'Calibrate' at the bottom of the screen. The app will confirm the calibration is done, tap 'Ok' to confirm and save.

The app will return you to the Saltwater Pump Calibration page after the above steps are completed. It is advisable to set the reminder for periodically calibrating the pump head, to do this tap on the box displaying the 'Last Time' and 'Next Time', enter the number of days, then save in the top right corner. For accurate testing it is suggested for this to be set to 45-60 days, after this time has elapsed a warning will appear on the screen in the app to remind you that calibration is due.

To exit tap the blue arrow in the top left.

CALIBRATING THE KH BUFFER SOLUTION PUMP (KH SOLUTION IN)

Go to the calibration settings in the Kamoer Remote app and select 'KH Rise Pump' from the common list. The 'KH Rise Pump Calibration' page will show you details of when the pump head was last calibrated, when the next calibration is due (this is a user defined setting), the current head calibration data and the option to 'Go to calibrate'.

- To begin tap on 'Go to calibrate' in the app.
- Make sure you have the glass beaker and digital scales ready to perform the calibration.
- When prepared tap 'I'm ready' in the app.
- Place the end of the blue hose that supplies KH buffer solution to the aquarium from the KH Manager into the glass beaker.
- In the Kamoer Remote app tap on the 'Run' button to start the pump head and flush the tubing. Once KH buffer solution is flowing into the glass beaker and there are no air bubbles tap the 'Stop' button.
- In the app add a run time for the pump calibration by tapping on the number under 'Input add time', it is recommended that the longest available time of 60 seconds is used for the most accurate calibration.
- Select 'I've finished setting' at the bottom of the screen to continue.
- Place the digital scales on a stable, flat and level surface then power on.
- Switch the scales to read in grams by depressing the mode (M) button until 'g' is shown.
- Empty out any liquid out of the glass beaker, then place on the scales.
- Press the Tare button (T) to zero the scales and compensate for the weight of the glass beaker then select 'I've tared' at the bottom of the screen in the app.
- Leave the scales on and remove the glass beaker, the display will show the weight of the beaker as a minus number.
- Place the end of the blue hose that supplies KH Buffer solution to the aquarium from the KH Manager back into the glass beaker.

- In the app tap ‘Start adding’ to begin running the pump, the screen will show a countdown in seconds as the pump runs.
- Once the pump stops running tap ‘Add ended’ at the bottom of the screen.
- Put the glass beaker on the scales, make sure the minus weight is still displayed before placing the beaker. This will give you the weight of the KH buffer solution minus the glass beaker.
- Enter the weight given on the scales into the app. The density of the KH buffer solution will need to be known to complete this step. The app automatically uses a density value of 1.068, if the KH buffer solution that has been weighed differs from this then the correct value will need to be entered. To do this tap on ‘modify the density’, enter the actual value and then tap save in the top right corner. If the density of the solution is not known it can be measured by placing a clean empty container on the scales, press tare to remove the weight of the container then add 1 litre of solution, divide the resulting weight by 1000 and this will give you the density.
- Finish the calibration by tapping ‘Calibrate’ at the bottom of the screen. The app will confirm the calibration is done, tap ‘Ok’ to confirm and save.

The app will return you to the KH Rise Pump Calibration page after the above steps are completed. It is advisable to set the reminder for periodically calibrating the pump head, to do this tap on the box displaying the ‘Last Time’ and ‘Next Time’, enter the number of days, then save in the top right corner. For accurate testing it is suggested to set this at 45-60 days, after this time has elapsed a warning will appear on the screen in the app to remind you that calibration is due.

To exit tap the blue arrow in the top left.

CALIBRATING THE KH TEST PUMP (KH REAGENT IN)

The KH Reagent pump is calibrated in the factory and it is not necessary to re-calibrate this under normal circumstances.

To calibrate the pump head go to the calibration settings in the Kamoer Remote app and select ‘KH Test Pump’ from the advanced list. A warning will be displayed in the app confirming that you want to proceed, tap ‘Still do it’ to continue or ‘OK’ to cancel.

- Remove the glass beaker, pH probe and plastic cover from the front of the KH Manager to expose the tubes.
- Tap ‘I’m ready’ at the bottom of the screen in the app.
- Hold the 5ml glass measuring cylinder at an angle so that the end is below the pointed nozzle and black optical sensors, then tap ‘Run’ in the app to start the KH test pump head.
- Once the drops are being produced with no air bubbles then tap ‘Stop’.
- Enter the amount of drops you want to measure for the calibration, it is suggested to use the maximum drop range of 300 for accurate calibration.
- When done select ‘I’ve finished setting’ at the bottom of the screen.
- Hold the empty 5ml glass measuring cylinder at an angle so that the end is below the pointed nozzle and black optical sensors as shown in the diagram on screen in the app.
- Select ‘Start adding’ in the app, the screen will show a countdown as the drops are added. It is important that care is taken to collect all the drops.

- Once the pump has stopped tap on ‘Add ended’ at the bottom of the screen and remove the 5ml glass measuring cylinder from the front of the KH Manager.
- Place the 5ml glass cylinder on a flat level surface and accurately read off the amount of KH test solution collected.
- Enter the measured amount into the app and finish the calibration by tapping ‘Calibrate’ at the bottom of the screen. The app will confirm the calibration is done, tap ‘Ok’ to confirm and save.

To exit tap the blue arrow in the top left.

CALIBRATING THE KH

An offset can be calibrated into the KH Manager if the end test results given are believed to be incorrect for some reason, i.e. if the test results from the machine are 7.6dKH but the KH is known to be 7.8dKH. If this calibration adjustment is used the KH Manager will automatically compensate for this during each test. Please note if there is a large difference then it is recommended to re-calibrate and check the pH probe, saltwater supply pump and that the reagent is mixed properly/not contaminated before taking this step. (See heading CHECKING THE TEST REAGENT in this manual for more details on confirming the useability of the test reagent).

Before this calibration can be done the KH Manager must have performed a recent test, if there has not been a recent test a warning will appear on the screen advising ‘Please recheck KH’. If this warning is shown perform a test with the KH Manager before commencing with this calibration.

Go to the calibration settings in the Kamoer Remote app and select ‘KH’ from the advanced list. The ‘KH Calibration’ page will show you details of when the KH was last calibrated, the current calibration factor and the option to ‘Go to calibrate’.

- To begin tap on ‘Go to calibrate’ in the app.
- The KH Calibration page will show the result of the lats test at the top of the page, select the text bar underneath and enter your known KH value in dKH, followed by ‘Done’.
- Tap on the highlighted Calibrate bar to confirm. To exit the KH calibration without saving a change select the blue arrow in the top left corner.
- The app will display a confirmation page, choose ok ‘Ok’ exit and finish.

RESETTING THE CALIBRATION ON THE KH MANAGER

It is possible to restore all the calibration data for the KH Manager to factory settings. After this the pH probe, saltwater pump head and KH buffer solution pump head will need to be calibrated as per the above instructions. This step is useful to reset any calibration done on the KH reagent pump head, as a KH calibration to the machine or clear any incorrectly entered calibration data that is causing the unit not to function properly.

Go to the calibration settings in the Kamoer Remote app and select ‘Reset Calibration’, tap on ‘Reset’ and then confirm by selecting ‘Reset’ in the pop up that appears at the bottom of the screen to perform the action, or select ‘Cancel’ to exit without resetting.

MANUALLY RUNNING THE PUMP HEADS

Each pump head built on to the KH Manager can be set to run manually, this can be used to test the operation, bleed air from the tubes or confirm the calibration for the saltwater and KH buffer solution pump heads.

To manually run the pump heads log into the Kamoer Remote app and tap on the devise icon for your KH Manager. Select the settings icon in the bottom right, when the settings page is displayed tap on 'Maintain' followed by 'Running Pumps'. In this page you can manually run the pump heads, adjust the speed of the stirring bead and flush the fluids from all the tubes.

Please note: if the KH Manager is set to run automatic plans it will disable these plans when you enter the 'Maintain' heading, a pop up will appear on screen to confirm, select 'Go' to continue or 'Cancel' to exit. After you exit the maintenance page automatic testing will be resumed as before.

RUNNING THE SALTWATER AND KH BUFFER SOLUTION PUMPS

When you are in the 'Running Pumps' page you can set the saltwater and KH buffer solution pumps to run a specified amount. This is useful for checking the calibration on both of these pump heads or for using the KH Manager to perform a one-off dose of KH buffer solution. To set an amount tap on the blue arrow next to 'Saltwater Pump' or 'KH Rise Pump' (KH buffer solution), enter the amount you would like to add and then choose 'Save' in the top right corner. The amount you have entered will now be displayed under the heading for that pump, to start the pump tap the corresponding box labelled 'Run', the pump will start to add the amount specified and will show a countdown of that amount as it is dosed. To stop mid dose tap the run button again which will now be displaying 'Stop'.

RUNNING THE KH TEST REAGENT PUMP AND WASTEWATER PUMP

To operate the KH reagent pump or wastewater pump enter the 'Running Pumps' page and tap on the blue box marked 'Run' that corresponds with either 'KH Test Pump' or 'Wastewater Pump' depending on the one you want to start. The pump will now begin to run, to stop the pump tap on the start box again that will now show 'Stop'.

RUNNING THE MAGNETIC STIRRER (STIRRING PUMP) AND ADJUSTING THE ROTATION SPEED

In the 'Running Pumps' page the magnetic stirrer can be operated to check that it is rotating properly or have the rotating speed adjusted. To test run the magnetic stirrer tap on the 'Run' button corresponding to the 'Stirring Pump' the bead should start to spin, to stop the stirrer tap on the run button again which should now be displaying 'stop'. If the bead skips or does not rotate properly it is possible that it is touching the end of the pH probe, touching the drain tube or the speed is set to high. Check that nothing is obstructing the bead, if the bead is free to move reduce the rotating speed by dragging the circle on the strength bar, displayed under 'Stirring Pump', to the left. A speed of around 25-30% is normally ideal. When spinning properly it is normal to see a whirlpool motion in the test beaker but there should not be air being drawn into the sample from the surface, if air bubbles are being drawn down in to the test sample reduce the speed of the stirrer.

EMPTYING LIQUID FROM THE PUMP HEADS AND TUBES

It is possible to set all dosing pumps to run together for the purpose of draining all liquid from the machine. This can be useful for flushing all the tubes for maintenance jobs such as changing the dosing pump heads or if the KH Manager needs to be disconnected and moved. To perform this enter the 'Running Pumps' Page in the app and tap on 'Start' next to 'Empty all liquid out of tubes'. The saltwater, test reagent and KH buffer pumps will start to run in reverse so that liquid is drained back into the aquarium, in the case of the saltwater pump, or back into the dosing container, in the case of the KH and test reagent pump. The waste pump will run as normal draining the test beaker. Once all the liquid is drained tap on the start button again, now displaying 'Stop' to stop the pump heads running. Please not that the pH probe will be exposed to air at this stage and should not be allowed to dry, if the probe is going to be out of water for some time the storage cap should be replaced with a enough storage solution to cover the tip of the probe and keep it hydrated, do not use pure water (RODI) to store the pH probe.

GENERAL SETTINGS

RENAMING THE KH MANAGER

As default the serial number for the unit is used as the name. To change this log into the Kamoer Remote app and tap on the devise icon for your KH Manager. Go to the settings icon in the bottom right, when the settings page is displayed select 'Name' from the list then tap on the white space and enter the new name for the unit. When finished press 'Done' followed by 'Save' in the top right corner.

UPDATING THE KH MANAGER FIRMWARE

Log into the Kamoer Remote app and tap on the device icon for your KH Manager then go to the settings icon in the bottom right. If your machine needs updating the new firmware version will be displayed in red next to the heading 'Update'. To begin the update tap on the new version firmware and follow any on screen prompts, a status screen will be displayed when the update is in progress this may take a few minutes. **During the update it is important not to turn power off to the unit.** Once complete the app will display that the update is finished.

If your KH Manager is already up to date the text 'Firmware version up to date' will be displayed in grey next to the heading 'Update'.

SETTING THE TIME

Your mobile device must be set to a 24-hour clock when using the Kamoer remote app, failure to do this will cause the time sync to fail.

The Kamoer remote app will set the units time to match your mobile device when you log in on the app. This will normally be displayed as a pop-up after you tap on the device icon asking if you would like to sync the time. If you confirm it will adjust the times to match, if you select to cancel the time will not be updated. **If you are accessing your unit remotely via the cloud and your mobile device has updated to a different time zone please be aware this will update the time of where your mobile device is and not the time zone where the unit is. In this situation you are best to cancel the request to sync the time.**

To manually sync the time log into the Kamoer Remote app and tap on the device icon for your KH Manager then go to the settings icon in the bottom right. Tap on the heading 'Time Setting' and then select 'Time Sync'. When done tap the blue arrow in the top left corner to exit.

If there is a connection lag between the KH Manager and your home network it is possible to see the time sync prompt appear, this does not mean that the time on the unit is lost or necessarily wrong. If communication is slow through the router to the cloud server the processing time will cause a delay long enough that a time sync is requested, normally this is due to the time being one or two seconds out.

FACTORY SETTINGS RESET

It is possible to clear any altered settings on the KH Manager to restore it to factory default. To do this log into the Kamoer Remote app and tap on the device icon for your KH Manager then go to the settings icon in the bottom right. Select the heading 'Factory Settings Reset' followed by 'Reset' in the prompt that appears on screen to continue or 'Cancel' to exit without resetting.

If you want to reset the calibration settings on the KH Manager go to the main settings tab in the Kamoer Remote app, select 'Maintain', the 'calibration' tile and then 'Reset Calibration', tap on 'Reset' and then confirm by selecting 'Reset' in the pop up that appears at the bottom of the screen to perform the action, or select 'Cancel' to exit without resetting. Please be aware you will need to follow the calibration instructions before setting the unit to test after performing this step.

REMOVING THE UNIT FROM YOUR KAMOER REMOTE ACCOUNT

The KH Manager can be removed from your Kamoer Remote account in two ways.

Log into your account and then in the 'My Devices' screen hold your finger on the tile for the device you want to remove. A pop-up will appear on the bottom of the screen, tap the red 'Remove' icon and the device will be unregistered from your account. To exit without removing the device tap anywhere on the screen above the pop-up.

Log into the Kamoer Remote app and tap on the device icon for your KH Manager then go to the settings icon in the bottom right. Select 'Remove Device' from the list followed by 'Remove' in the prompt that appears on screen to continue or 'Cancel' to exit without removing the device.

Note: Removing the device from your account will clear any stored test data.

LIMITED WARRANTY

Warranty is only valid for units correctly installed and maintained, all faults caused by improper use or water damage are not covered.

Should any defect in material or workmanship be found within 12 months of the date of purchase D-D The Aquarium Solution Ltd undertakes to repair, or at our discretion replace the defective part free of charge.

Our policy is one of continual technical improvement and we reserve the right to modify and adjust the specification of our products without prior notice.

Any warranty claim without valid proof of purchase will not be accepted.