



Reef Master SPA

User Manual

A3 2024-01-22



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Quick search keywords

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Print a document

This document supports high-quality printing.

Reading Tips

Symbol Description

 Prohibition  Important precautions  Operation and usage tips  Vocabulary explanation and reference information

Usage Suggestions

Kamoer provides the following documentation for Reef Master SPA users:

1. 《Reef Master SPA User Manual》
2. 《Reef Master SPA Quick Start Guide》

It is recommended that users first read the 《Reef Master SPA Quick Start Guide》 to understand the usage process. Please read the 《Reef Master SPA User Manual》 for detailed product information.

Safety Instructions

⚠ Please read these instructions carefully before using the Reef Master to ensure proper operation of the device.

⚠ During transportation, use protective packaging to protect the equipment from any damage. After unpacking, please dispose of all packaging components in a way that will not cause damage to the environment. All materials used for packaging equipment are environmentally friendly; They are 100% recyclable.

Be cautious! When unpacking, packaging materials should be kept out of reach of children.

⊘ Children and vulnerable groups with limited physical, sensory or mental abilities are not allowed to use this device, and those who are not familiar with this device are not allowed to use it.

Download Kamoer Remote App

1. Scan the QR code and download the application corresponding to the following icon.



iOS



Kamoer Remote



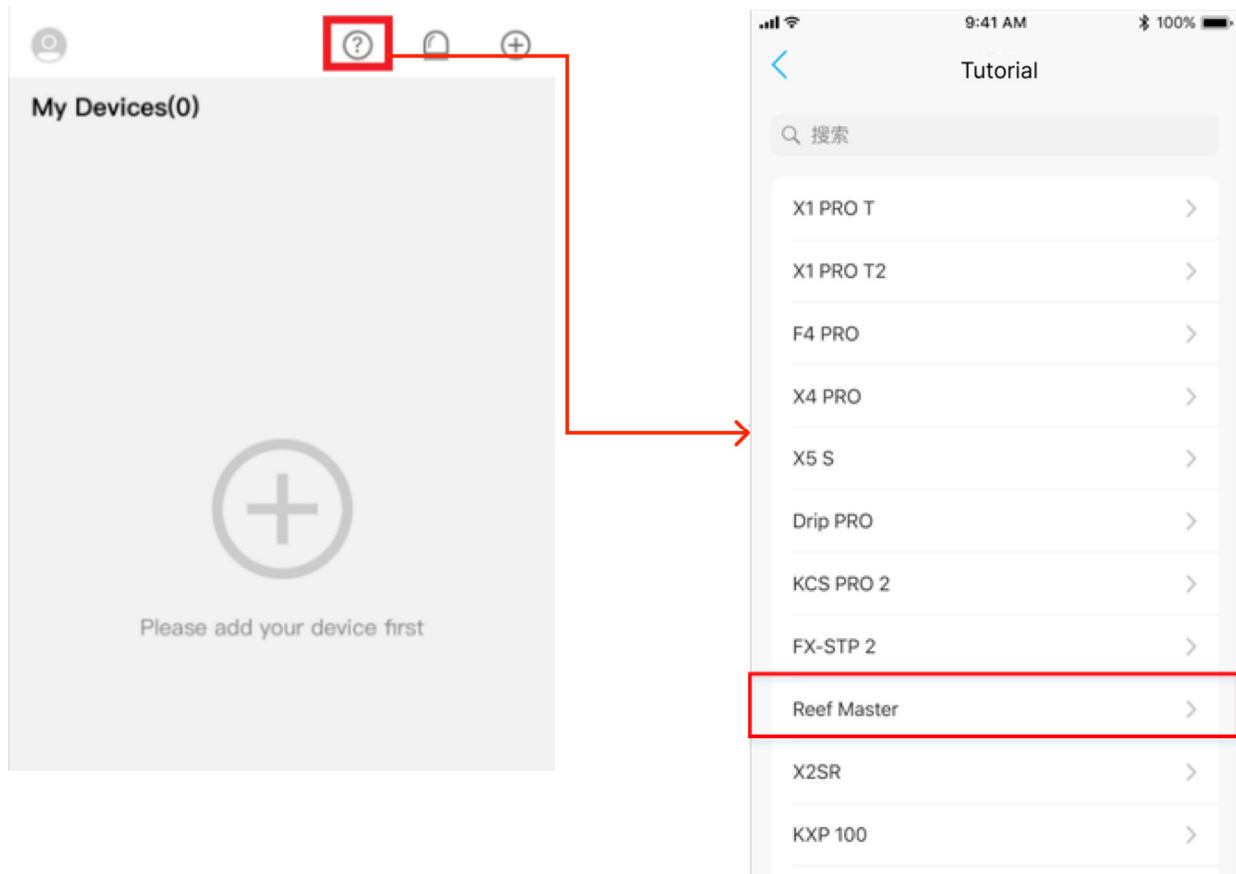
Android (Google Play)

2. Apple users enter the App Store, while Android users enter Google Play and search for 'Kamoer Remote'. Find the application download corresponding to the icon.

Kamoer Remote App supports Android 4.4 and above systems, and iOS 9.1 and above systems.

Get Tutorials

After installing the app, open it and click the "?" button in the upper right corner of the device page to enter the tutorial page. Click to enter the corresponding device model, including user manual and frequently asked questions.



Catalog

Reading Tips.....	1
Symbol Description.....	1
Usage Suggestions.....	1
Safety Instructions.....	2
Download Kamoer Remote App.....	2
Get Tutorials.....	3
Catalog.....	4
Product Overview.....	7
Introduction.....	7
Functional Highlights.....	7
Application Occasions.....	8
Unpacking Preparation.....	8
Component Name.....	9
Display Screen Status Description.....	10
First Use.....	13
Product Installation.....	13
APP Operation.....	15
Distribution Network Equipment.....	15
Overview of App Interface Module.....	16
Status Interface Function.....	17
Reagent Bottle Remaining Quantity Setting.....	19

Manual Detection	20
Automatic Detection	21
Retest Function.....	23
View History	25
System Settings.....	26
Linkage Function	27
Introduction to Linkage Function	27
Device Binding.....	29
Use of Titration Equipment	31
Use of Calcium Reactor Equipment.....	35
Maintenance Function	37
Running and Stirring.....	38
Empty All Pipelines.....	39
Test Value Correct	40
Time Setting.....	43
Equipment Maintenance.....	45
Magnetic Stirring	45
Appendix.....	48
Technical Parameters	48
After sales warranty information.....	49

Product Overview

This chapter mainly introduces the characteristics, application scenarios, and unpacking instructions of Reef Master SPA.

Product Overview

Introduction

Reef Master is an automated equipment for testing water quality in aquatic environments. The Reef Master CMK Bone Master can test three parameters: calcium, magnesium, and KH. In addition to testing calcium, magnesium, and KH, the Reef Master SPA can also test parameters such as nitrite, nitrate, and phosphate.

The measurement method can choose manual measurement and automatic detection function. Users can easily view test results and set test parameters in Android or iOS apps. When there are abnormal test values, the device will automatically push an alarm to the app. The equipment can also control the titration pump or calcium reverse pump based on the test results, and adjust the water quality to the appropriate level.

Functional Highlights

- CMK supports concentration detection of calcium, magnesium, and KH in seawater
- SPA additionally supports detection of nitrite, nitrate, and phosphate
- App remote control, allowing for real-time sensor values and historical records to be viewed
- Support automatic and manual detection modes
- App remote control, allowing for real-time sensor values and historical records to be viewed
- Alarm push for abnormal detection values
- Support for online firmware upgrades
- Equipped with a display screen to view detection results and status

- Linkage control of F4 PRO titration pump and Calcium Reactor Pump can be achieved to automatically adjust water quality parameters

Application Occasions

- Marine organism breeding: including hard coral (SPS), soft coral (LPS), and mixed coral (SPS/LPS)
- Other occasions where water quality parameters such as calcium, magnesium, KH, nitrite, nitrate, and phosphate need to be tested

Unpacking Preparation

- Before opening the packaging box, check whether the outer packaging has been damaged during transportation.
- After opening the packaging box, refer to the packing list to confirm that all components are missing and check for visible damage.

If any defects are found during the unpacking process, please contact the manufacturer immediately.



- | | |
|---|---|
| 1. Reef Master SPA Host | 2. Calcium and magnesium A detection reagent |
| 3. Calcium magnesium B detection reagent | 4. KH detection reagent |
| 5. Nitrate and nitrite detection reagent C | 6. Nitrate and nitrite detection reagent A |
| 7. Phosphate detection reagent A | 8. Phosphate detection reagent B |
| 9. Seven test reagent tubes, each 1 meter long | 10. 250ml reagent bottle cap |
| 11. 100ml reagent bottle cap | 12. Two waste discharge pipes, each 2 meters long |
| 13. Two seawater sample tubes, each 2 meters long | 14. Power supply |

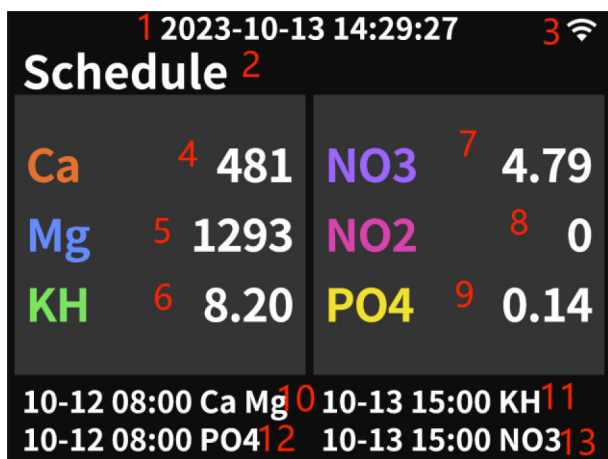
Component Name







- | | |
|--------------------------------|-------------------------------------|
| 1. Color display screen | 2. Front cover |
| 3. Front hood decorative light | 4. External communication interface |
| 5. DC24V power cord | 6. Sea water sample connection 1 |

- 7. KH detection reagent connector
- 8. Calcium magnesium A detection reagent connector
- 9. Calcium magnesium B detection reagent connector
- 10. Waste liquid connector 1
- 11. Sea water sample connection 2
- 12. Nitrate nitrite joint A
- 13. Spare
- 14. Nitrate nitrite joint C
- 15. Phosphate joint A
- 16. Phosphate joint B
- 17. Cleaning fluid connector
- 18. Waste liquid connector 2

Display Screen Status Description



1. Status or real-time clock display bar
2. Working mode: Display working mode, device supports schedule mode and manual mode
3. WiFi connection status:  indicates in the distribution network,  indicates successful distribution network,  indicates network connection failure, and  indicates server connection failure
4. The latest test calcium value and status display, in PPM: background color green indicates low test value, red indicates high test value, and gray indicates normal test value

5. The latest test magnesium value and status display, in PPM: background color green indicates low test value, red indicates high test value, and gray indicates normal test value
6. The latest test KH value and status display, in PPM: green indicates low test value, red indicates high test value, and gray indicates normal test value
7. The latest test nitrate value and status display, in PPM: green indicates low test value, red indicates high test value, and gray indicates normal test value
8. The latest test nitrite value and status display, unit PPM: green indicates low test value, red indicates high test value, and gray indicates normal test value
9. The latest test phosphate value and status display, in PPM: green indicates low test value, red indicates high test value, and gray indicates normal test value
10. Test plan: Time and test items being measured or already measured
11. Test Plan: Next Test Time and Test Items
12. Test plan: Time and test items being measured or already measured
13. Test Plan: Next Test Time and Test Items

First Use

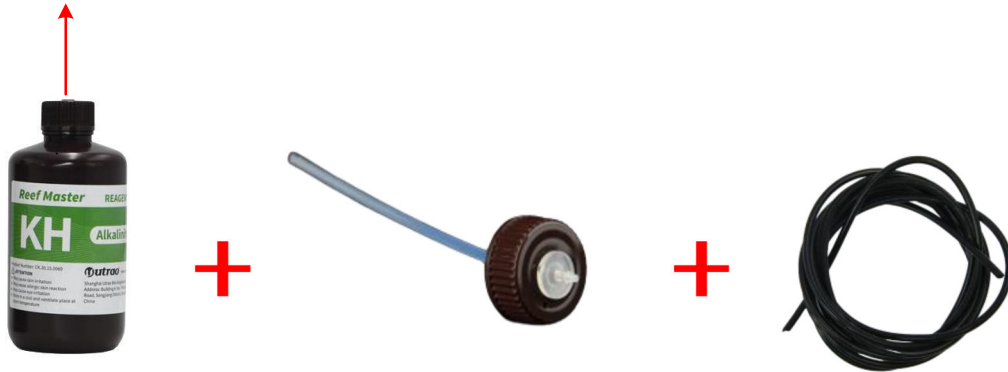
This chapter mainly introduces how to check and confirm the normal operation of various functions of the equipment after assembly for the first time.

First Use

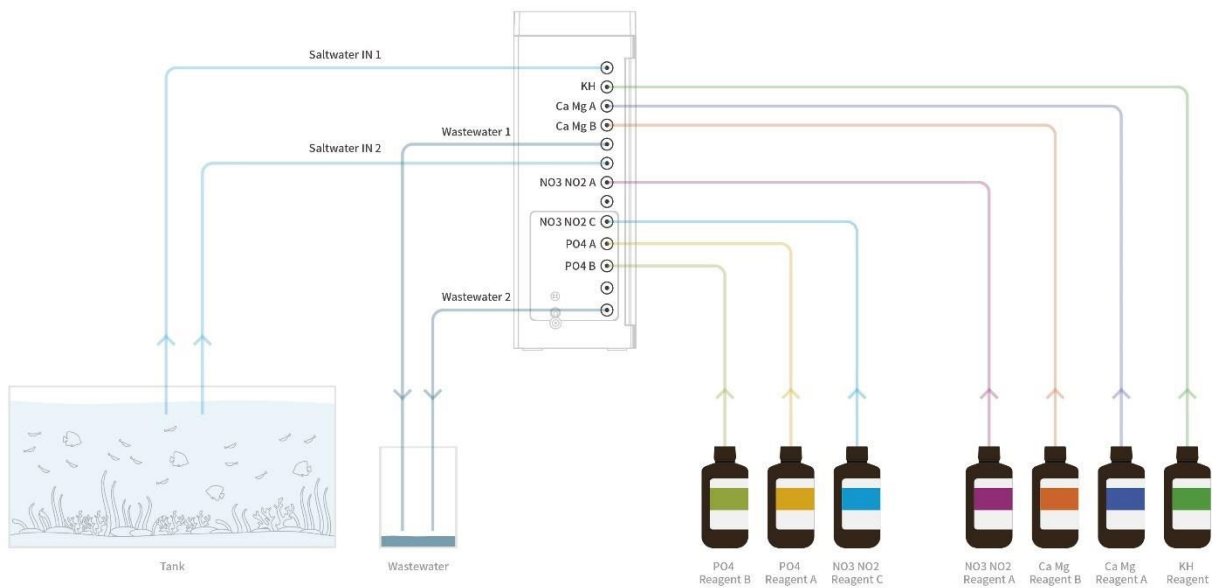
Product Installation

Reagent bottle installation

Remove the original reagent bottle cap



Connect the pipeline according to the following diagram



Open the app, add devices, and follow the app prompts to proceed.

APP Operation

This chapter mainly introduces how to use the app to operate Reef Master SPA.

APP Operation

Distribution Network Equipment

The app requires a network connection to set and read device parameters, so the device configuration needs to be connected to the network. On the homepage of the device list, click the add button in the upper right corner to enter the device's distribution interface. Click Reef Master device or other devices to enter the Bluetooth connection interface, and find the corresponding device serial number, such as **KAMOER_ SPA_ xxxxxxx**, click to enter and follow the interface prompts to distribute the network.

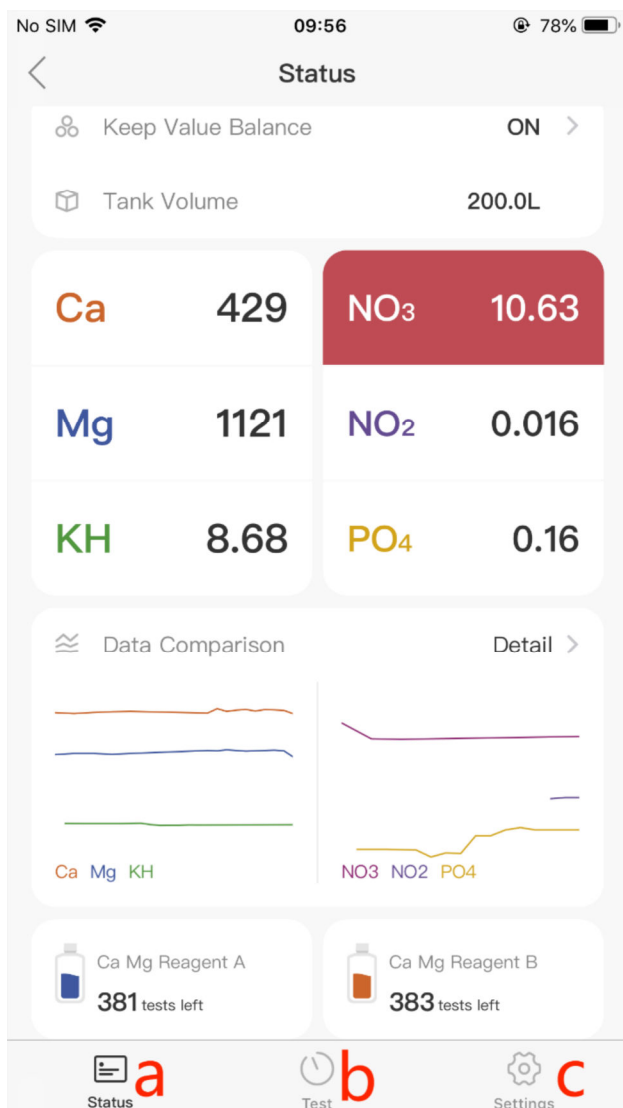


- i** a. To configure a device to connect to Wi Fi, you only need to configure it once. After successful configuration, as long as the app can connect to the network, you can find the device in the device list by opening the app.
- b. If the device configuration fails to connect to Wi Fi, restart from the first step.

Overview of App Interface Module

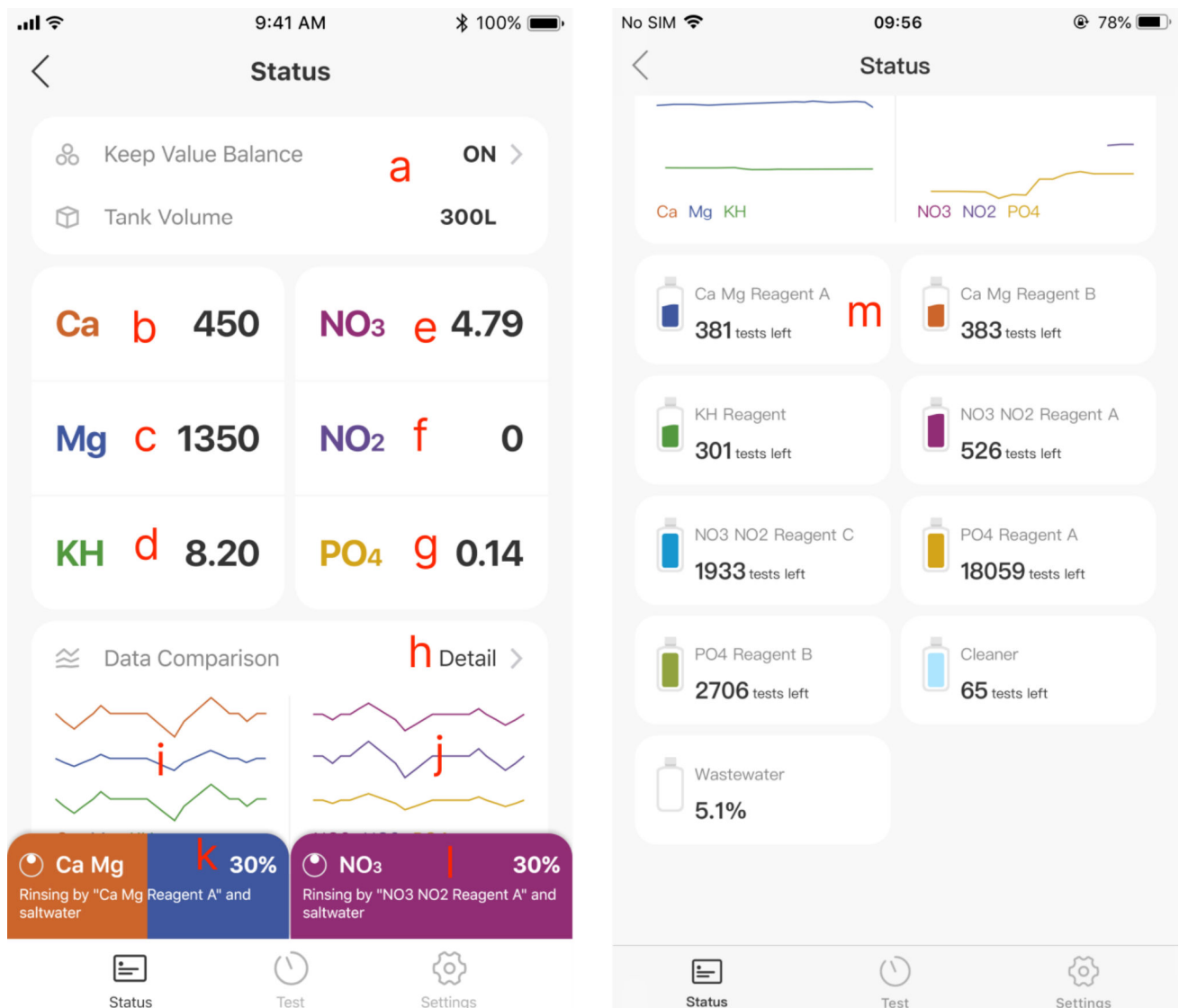
Open the app and click Reef Master in the device list to enter the Reef Master operation interface.

The interface module functions are as follows:



- a. **Status:** In the status module, you can view the real-time values of each element detection, the status of each element detection, and the remaining amount of solution bottles
- b. **Test:** Trigger detection here. You can choose to manually trigger detection or set a detection plan, and the device will automatically perform detection according to the plan
- c. **Settings:** Here for firmware version viewing, firmware upgrades, device maintenance, calibration, etc

Status Interface Function

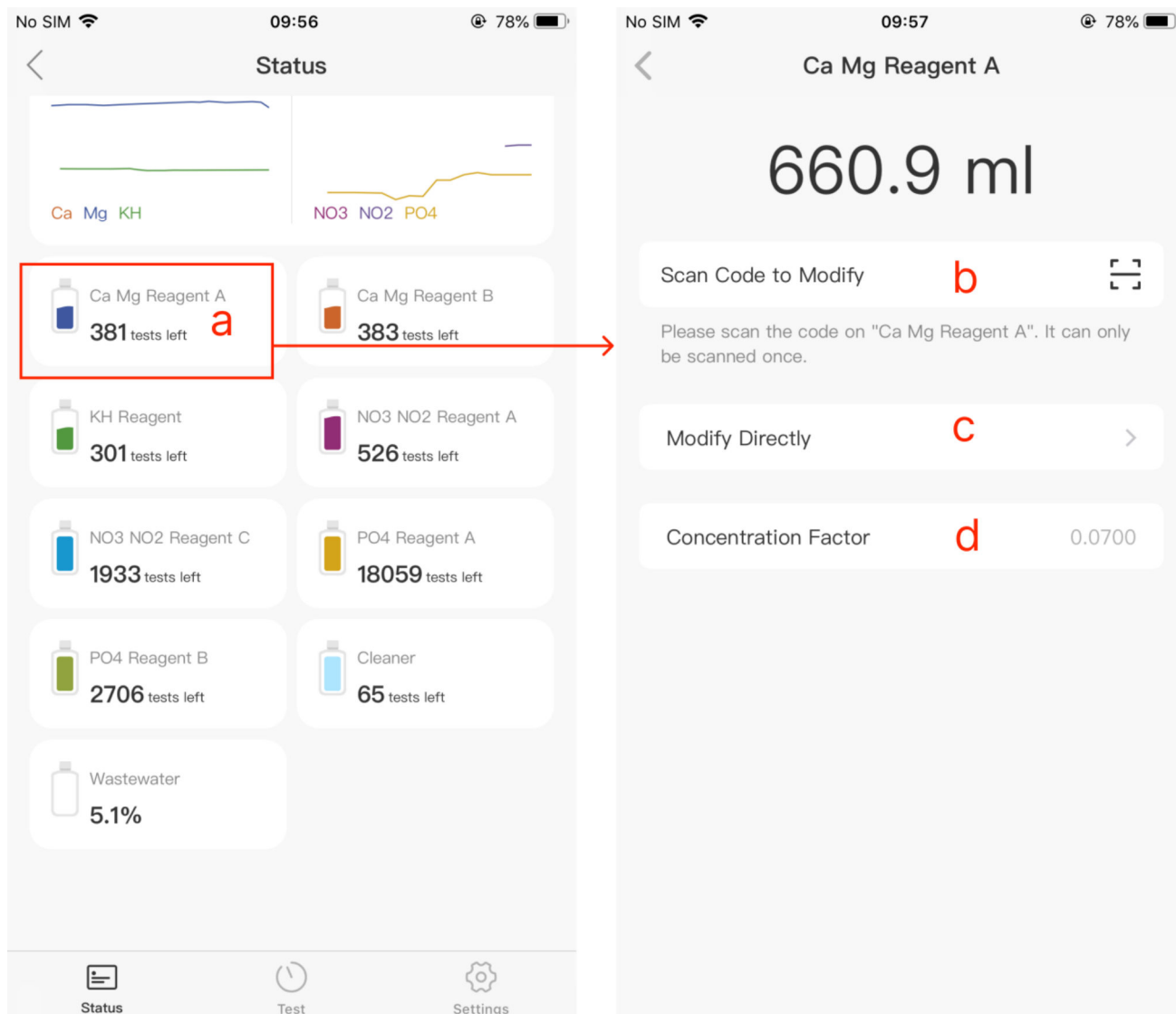


- a. **Maintain stable values (extended functionality - under development):** Automatically adjust the F4 Pro titration pump or calcium reverse pump based on the element values detected by the device, completing the automatic adjustment of water quality; After the function is turned on, the Tank Volume will be displayed, which is used to calculate the number of elements required to adjust water quality parameters
- b. **The latest detected calcium value**, in ppm, will change the background color in the display area based on the detection status. Green indicates a low value and red indicates a high value

- c. **The latest magnesium value detected**, in ppm, will change the background color in the display area based on the detection status, with green indicating a low value and red indicating a high value
- d. **The latest detected KH value**, in dKh, will change the background color in the display area based on the detection status. Green indicates a low value and red indicates a high value
- e. **The latest nitrate value detected**, in ppm, will change the background color in the display area based on the detection status. Green indicates a low value and red indicates a high value
- f. **The latest nitrite value detected**, in ppb, will change the background color in the display area based on the detection status, with green indicating a low value and red indicating a high value
- g. **The latest detected phosphate value**, in ppm, will change the background color in the display area based on the detection status. Green indicates a low value, while red indicates a high value
- h. Click to view **the history chart of each element detection**
- i. **Trend line of calcium, magnesium, and KH detection values**
- j. **Trend line of nitrate, nitrite, and phosphate detection values**
- k. **Progress of calcium and magnesium testing**
- l. **Progress of nitrate detection**
- m. **The remaining quantity status of the reagent bottle** will be evaluated by the reagent bottle to provide the customer with a remaining number of tests. When the number of tests is less than 10, the App will prompt the customer to replace the reagent. When the number of tests is less than 5, the equipment will stop testing and wait for the customer to replace the reagent before continuing the testing

Reagent Bottle Remaining Quantity Setting

Reagents will decrease with use, and they need to be replenished when the trial dose is insufficient. After obtaining the new reagent, scan the QR code on the reagent bottle through the Kamoer Remote App, and set the reagent capacity based on the QR code to update the capacity of the reagent bottle.

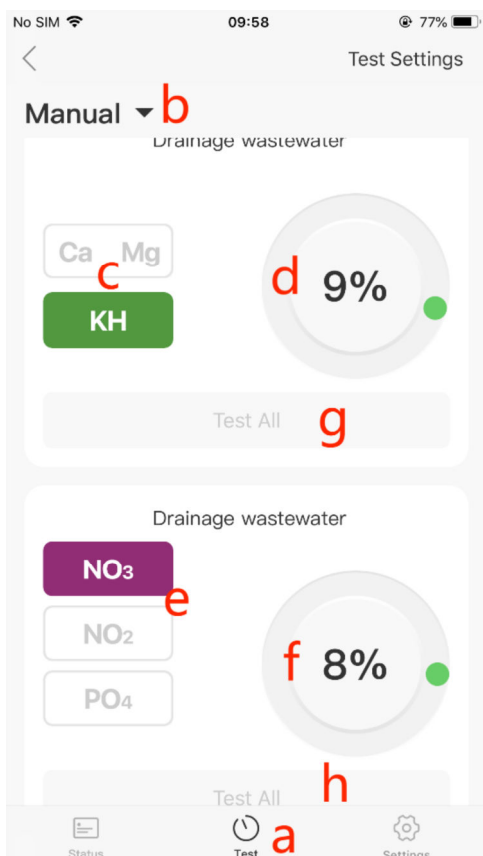


- a. Click on the reagent bottle to enter the remaining quantity modification interface

- b. If you need to increase the remaining amount of reagent bottles, you need to purchase reagents. There is a QR code for the reagent information on the reagent bottle, and scan this QR code to update the capacity of the reagent bottle
- c. Directly modify the remaining quantity. If the actual quantity does not match the displayed quantity on the interface, the remaining quantity can be modified to a smaller size
- d. Concentration coefficient, which displays the concentration coefficient of reagents. Different reagents have different concentration coefficients

Manual Detection

In the detection module, users can manually trigger a detection based on their own needs, or by setting a plan, the device automatically performs the detection according to the plan. Whether manual or automatic detection, the detection values will be uploaded to the server's historical records. The following figure shows the manual detection function:

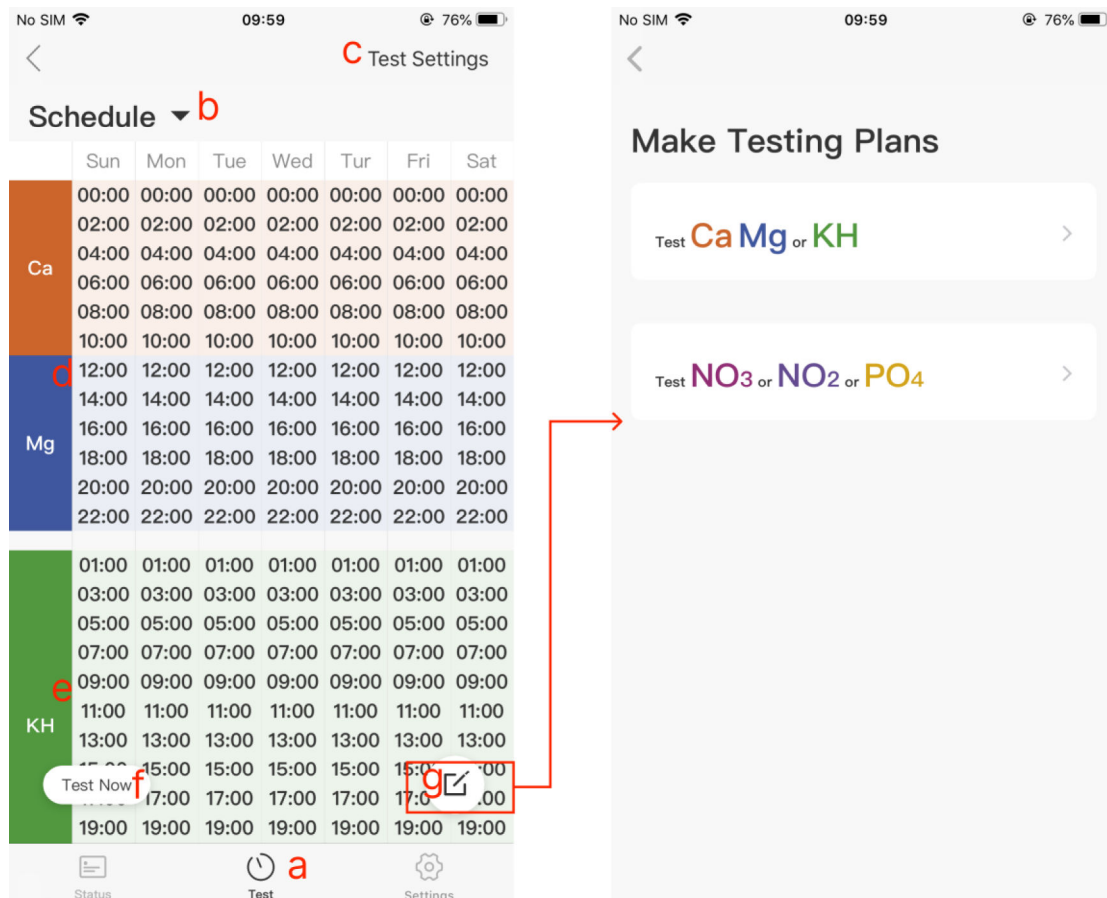


- a. Click to enter the detection module
- b. You can switch between manual detection mode and automatic detection mode here
- c. The selection of detection parameters can be either calcium magnesium or KH. The selected detection items will be highlighted. After selecting the detection items, click the detection button on the right to perform the detection
- d. Detection: Click to start detecting the detection parameters selected on the left side, and display the progress

- e. The selection of testing parameters can include selecting parameters such as nitrate, nitrite, phosphate, etc. The selected testing items will be highlighted. After selecting the testing items, click the testing button on the right to perform the testing
- f. Detection: Click to start detecting the detection parameters selected on the left side, and display the progress
- g. One click detection of calcium, magnesium, and KH parameters, the program will automatically complete the detection of these three parameters
- h. One click detection of nitrate, nitrite, and phosphate parameters, the program will automatically complete the detection of these three parameters

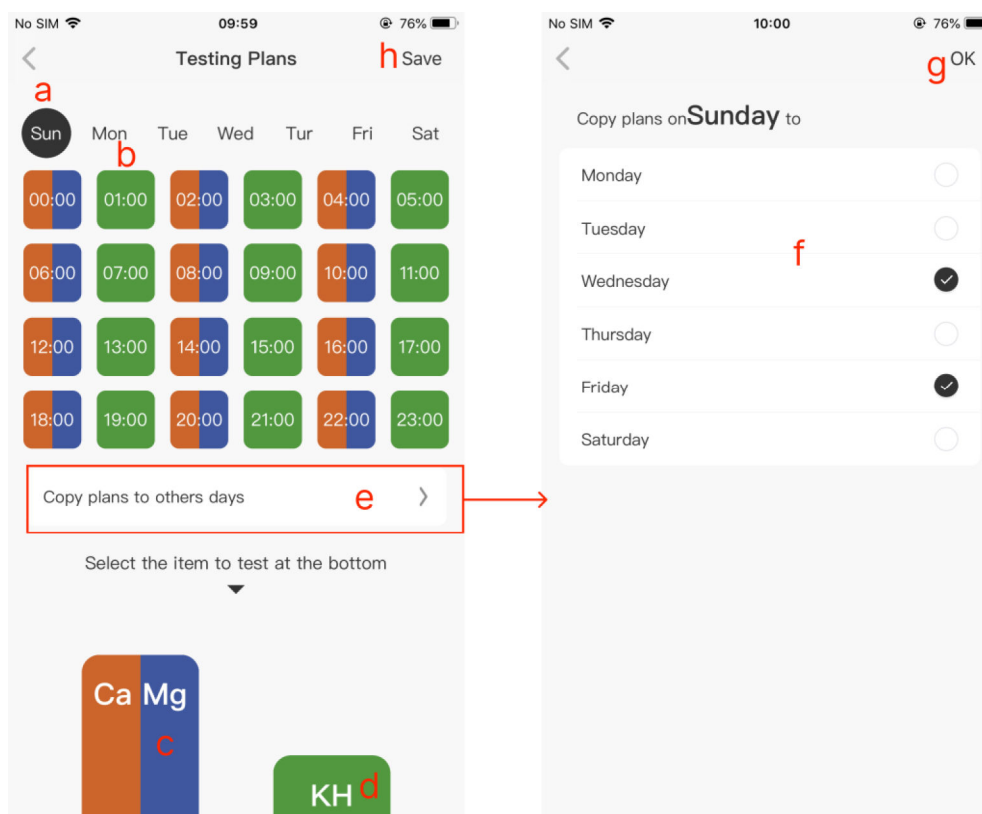
Automatic Detection

The following figure shows the automatic schedule mode:



- a. Click to enter the detection module
- b. Detection mode switch, where you can switch between manual or schedule detection mode
- c. Detection settings, where detection related parameters can be set, such as retest function settings, test range viewing selection, test rinsing times settings, etc
- d. The schedule for calcium and magnesium testing can be set separately for each day of week
- e. The schedule for KH testing can be set separately for each day of the week
- f. Immediate detection. If you want to start a detection immediately when there is no plan to run it, you can click on it, select the parameters to be detected, and start a parameter detection immediately
- g. Click to enter the editing of the testing plan. The testing parameters are divided into two groups: one is calcium magnesium KH, and the other is nitrate, nitrite, phosphate. The parameters in each group need to be staggered for testing

Click on a group parameter that requires editing the plan to enter the interface shown in the figure:

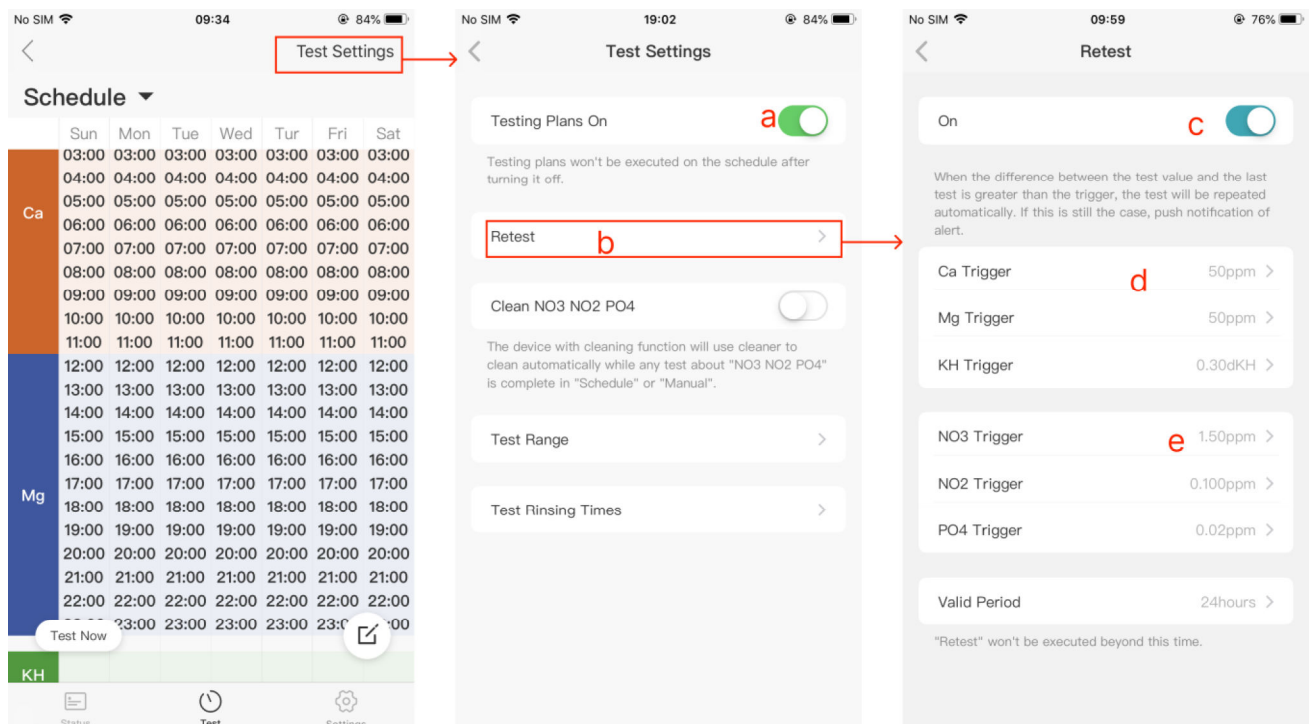


- a. Week label, click to select the week label, and the corresponding time plan for that day will be displayed below, with black representing selected
- b. A daily schedule, with highlighted items representing the projects to be executed, allowing only one parameter to be executed at each time point
- c. Select the items that need to be detected, with high items representing the selected items. Then, click on the corresponding time in the time list above, and the corresponding time will automatically perform the detection of the item

For example, a calcium and magnesium test needs to be conducted on Monday at 02:00; Firstly, click on the label for Monday ->click on the label for calcium and magnesium testing items ->click on the label for 02:00 in the time list ->complete the setting
- d. KH detection label; When setting the detection plan for KH, click on the KH label and then set the time in the schedule above the label
- e. Copy the plan to another day; After completing the plan setting for a day, you can copy the plan for that day to other days, making it easier for other days to set the same testing plan
- f. Other day schedule settings; The selected item represents the need to copy the plan to this day
- g. OK ; After setting up, click OK to confirm the settings and return to the previous interface
- h. Save the testing plan; All modifications, including plans copied to other days, must be saved and take effect on this interface

Retest Function

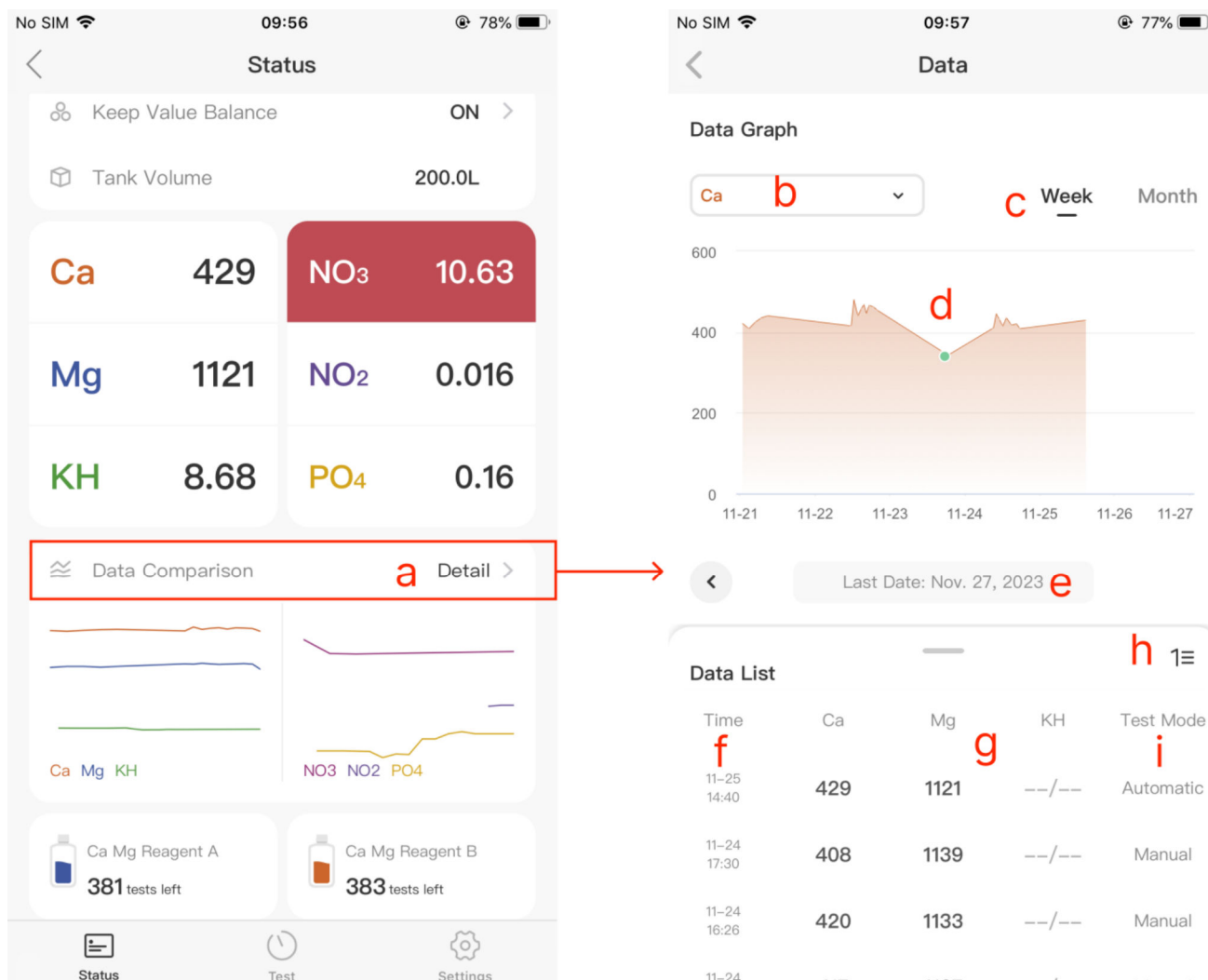
The principle of the duplicate detection function is that when there is a significant difference between the latest detection value and the previous detection value within a certain period of time, it automatically re detects to determine whether the detection value is truly abnormal; When the duplicate detection function is enabled, the measurement is based on the duplicate detection value.



- a. The switch for automatic detection plan will not perform automatic detection when the switch is turned off
- b. Retest, click to enter the re test parameter setting interface
- c. Switch for retesting function; When the switch is turned on, the retest function takes effect
- d. Retest parameter settings; This parameter is the difference between the latest detection and the previous detection. If the difference between the latest detection value and the previous detection value is greater than this number, a retest will be triggered; For example, the difference in triggering repeated detection for calcium setting is 50ppm. The calcium concentration detected last time was 450ppm. If the calcium concentration detected this time is less than 400ppm or greater than 500ppm, a retest will be triggered
- e. Validity period, duration of interval between this test and the last test. If the interval between this test and the last test is within this duration, and the concentration of this test also meets the difference condition for retest, then a retest will be triggered. If beyond this duration, even if the difference condition for retesting is met, the retest will not be triggered

View History

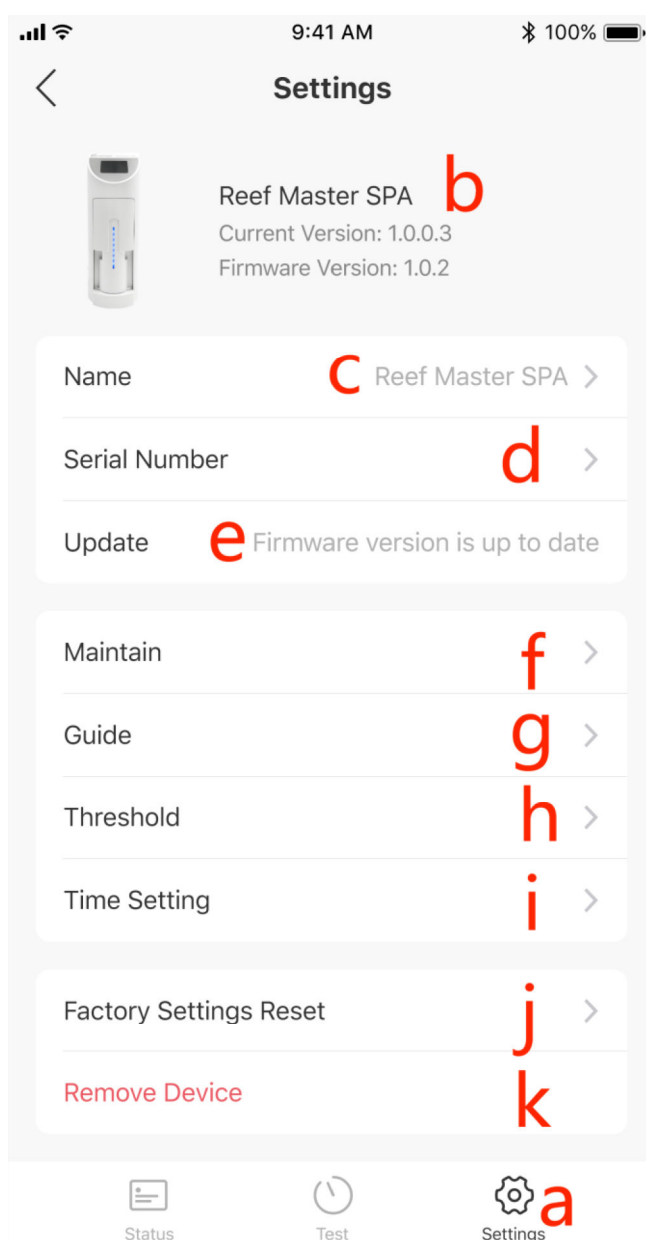
Click on the data module to enter the data history interface, where you can view the history of the data.



- a. Click on the icon details on the status page to enter the view history details page
- b. Click to switch the parameters of the history to be viewed
- c. Viewing the period of historical records, including the length of weeks and months
- d. History curve, click on the curve to view the history values of the corresponding positions
- e. Deadline, displays the date when the current chart is due
- f. The start time of testing items in the history table

- g. Value of detection items in the history table
- h. Switching between forward and reverse sorting; Forward sorting is a time order from low to high, with the latest record at the bottom of the table; Reverse sort by time from low to high, with the latest record at the top of the table
- i. Display whether the history is automatically detected or manually detected

System Settings



- a. Enter the device system settings module
- b. **Display of device version information**
- c. **Name**, click here to modify the device name, which will be displayed on the app homepage
- d. **Serial number**, click to view the device serial number
- e. **Firmware upgrade**. If the firmware needs to be upgraded, there will be a prompt here. Users can follow the app's instructions to upgrade
- f. **Maintain**: Here, you can manually run the equipment's pumps, magnetic stirring, etc. to fill or empty pipelines, and check if the equipment's pumps or magnetic stirring are operating normally
- g. **Using guidance**, you can follow the app's

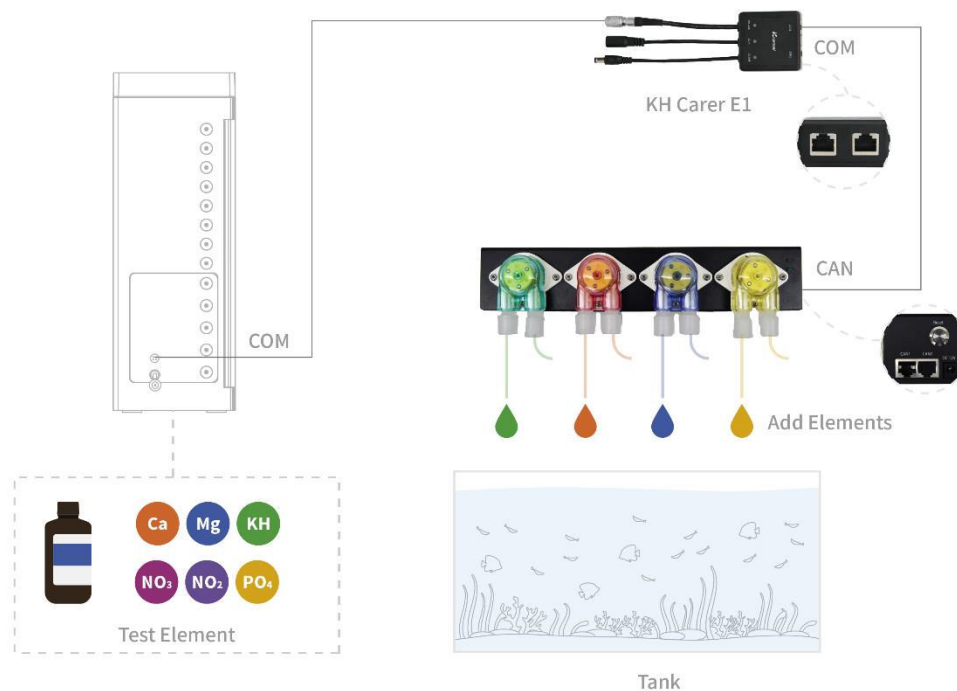
guidelines for pipeline connection, pipeline filling, and equipment usage guidance here

- h. **Threshold**, set the detection threshold here. When the detection value exceeds this threshold range, the device will push alert information to the app
- i. **Time setting**: Here, you can manually synchronize the time of the device. In case of networking, time synchronization only needs to be done once, and the device will automatically synchronize the time through the network
- j. **Restore factory settings and restore** firmware system parameters to default values
- k. **Remove the device** and unbind the app from the device

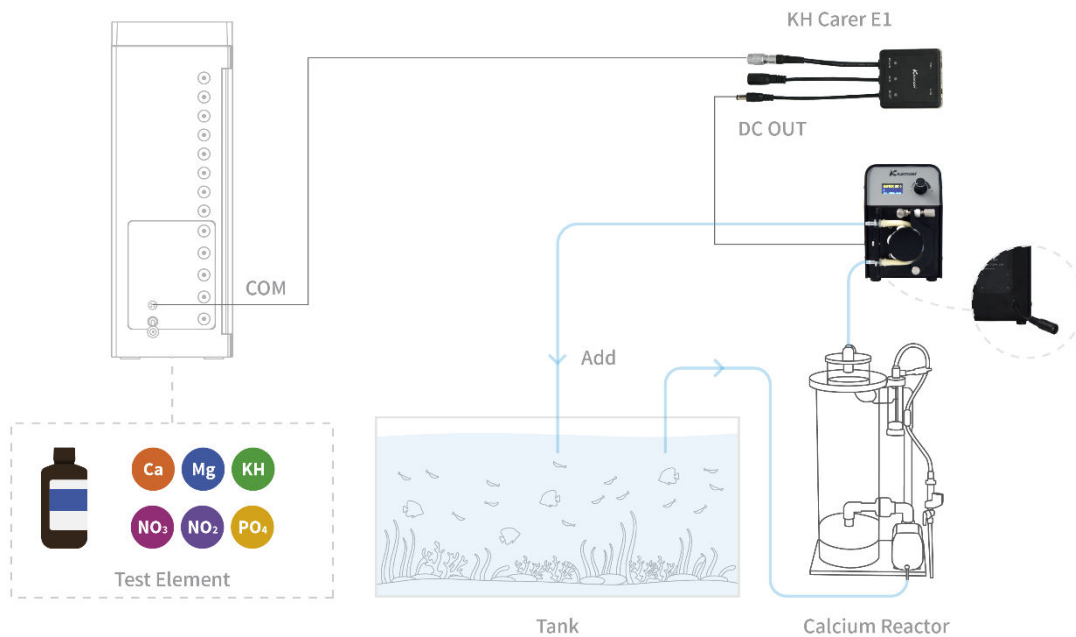
Linkage Function

Introduction to Linkage Function

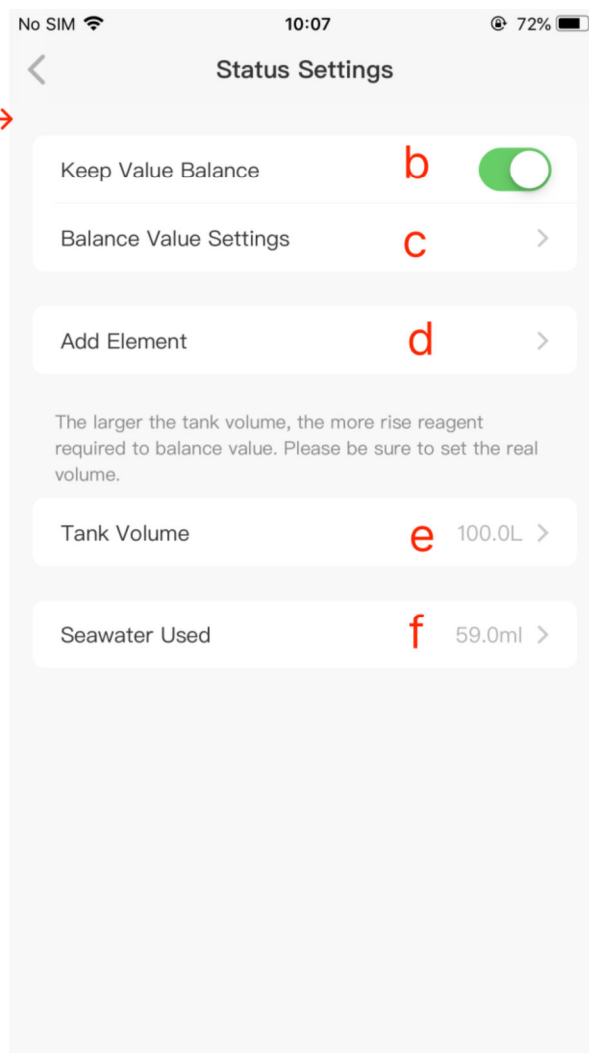
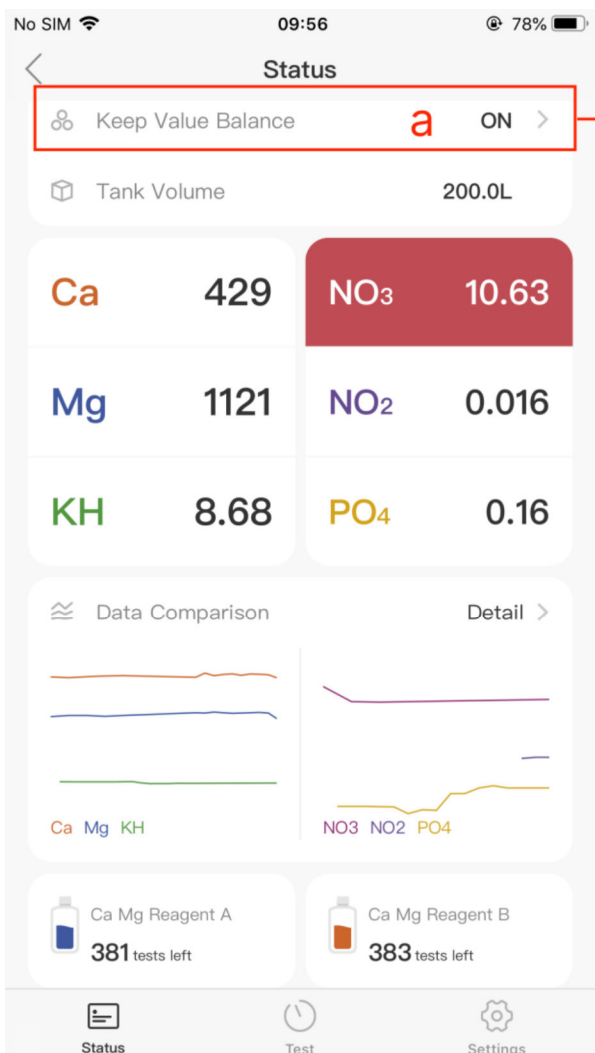
The linkage function refers to the Reef Master's linkage between the titration pump and the Calcium Reactor Pump, which controls the water quality of the titration pump and Calcium Reactor Pump through the parameters detected by the Reef Master.



Reef Master linked F4 PRO titration pump



Reef Master linked Calcium Reactor Pump

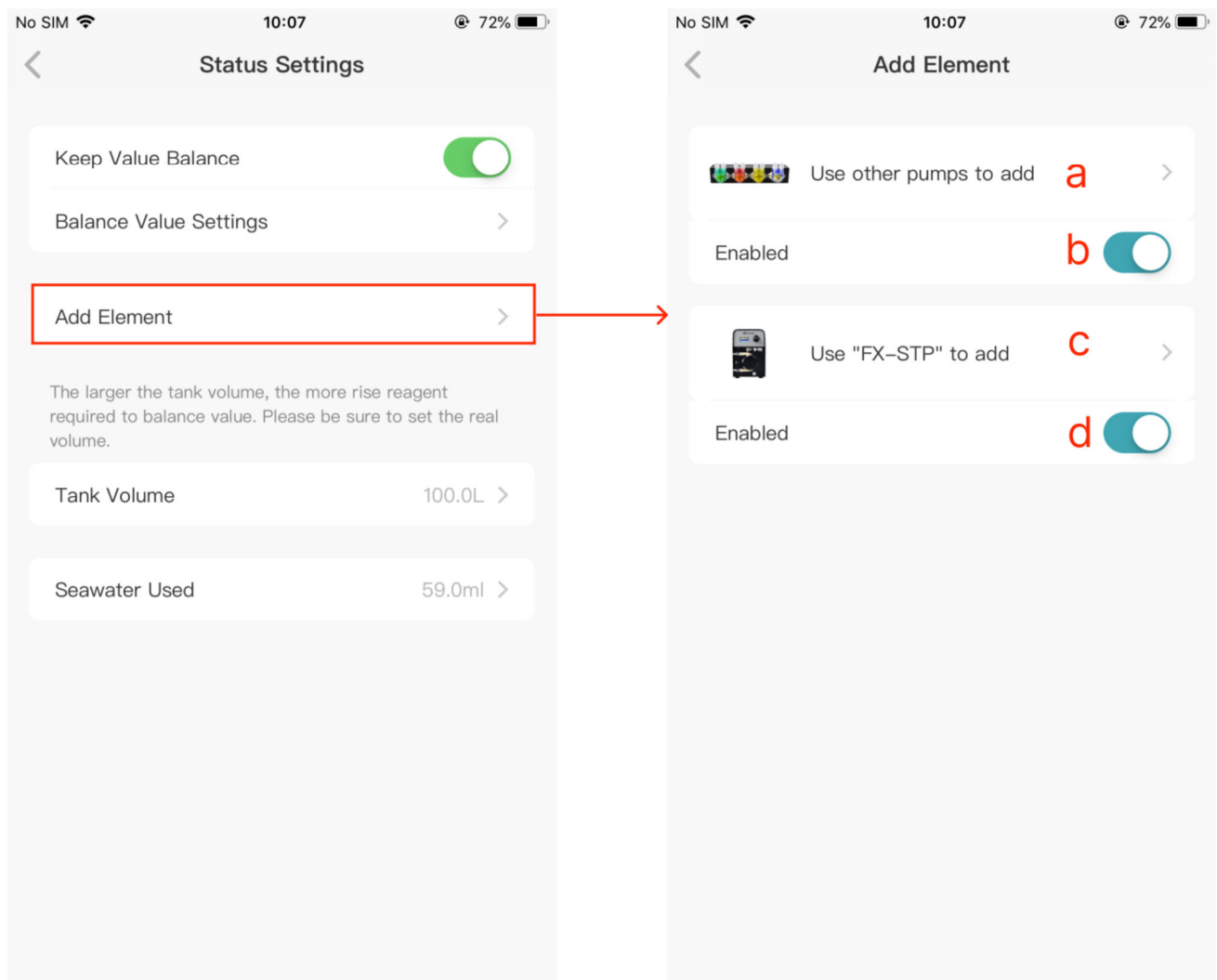


- a. On the status homepage, click “Keep Value Balance” to enter the linkage parameter setting interface
- b. Maintain a stable value switch. This switch is turned on, and the linkage control function takes effect. When this switch is turned off, the linkage function does not work
- c. Parameter retention value setting, such as setting a calcium retention value of 450ppm. When the detected calcium value is below 450ppm, the titration will adjust the amount of calcium reagent added to bring the detection value back to 450ppm
- d. Add elements and set Reef Master binding devices and parameters for these devices, such as titration pumps and Calcium Reactor Pump
- e. Tank Volume refers to the volume of water in the cylinder; The equipment will calculate the amount that needs to be adjusted based on the volume of water in the cylinder and the current concentration of elements, so this volume should be filled in carefully and default parameters should not be used
- f. The amount of seawater used; The amount of seawater used by the equipment statistics

Device Binding

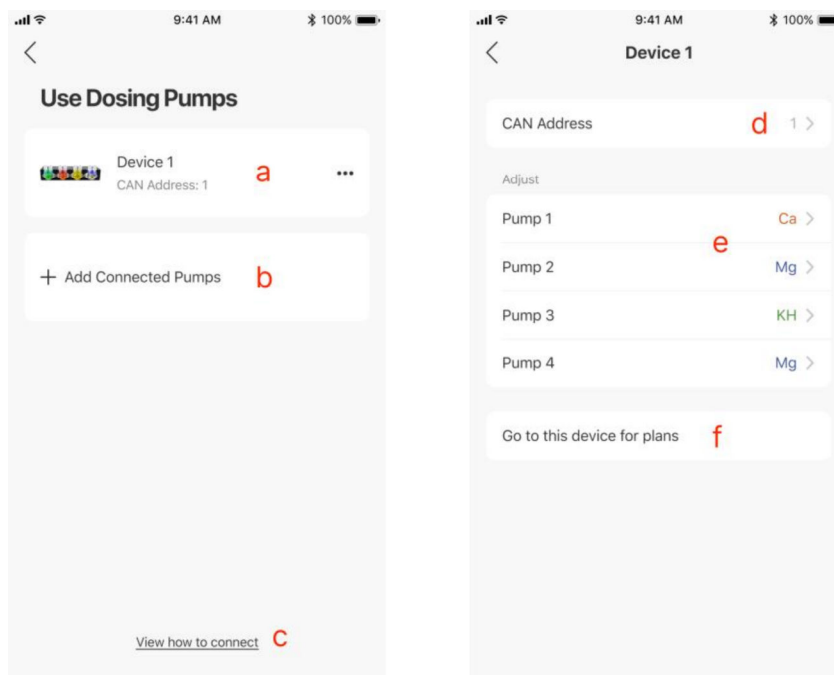
The adjustment of elements can be achieved through titration pumps and calcium reactor pumps. The titration pump is relatively flexible and can be selected for titration adjustment based on various element parameters. The calcium reactor pump is only adjusted through KH; The titration pump needs to have a wired communication interface, such as F4 PRO, DDP4, DDP4 PRO, etc.

The titration pump and the calcium reactor pump can simultaneously participate in regulating water quality parameters.



- a. Adjusting water quality parameters through a titration pump
- b. The function switch for adjusting water quality parameters through titration; When the switch is turned on, the titration adjustment parameters take effect
- c. Adjusting water quality parameters through a calcium reactor
- d. The function switch of calcium reactor to regulate water quality parameters; When the switch is turned on, the calcium counter adjustment parameter takes effect

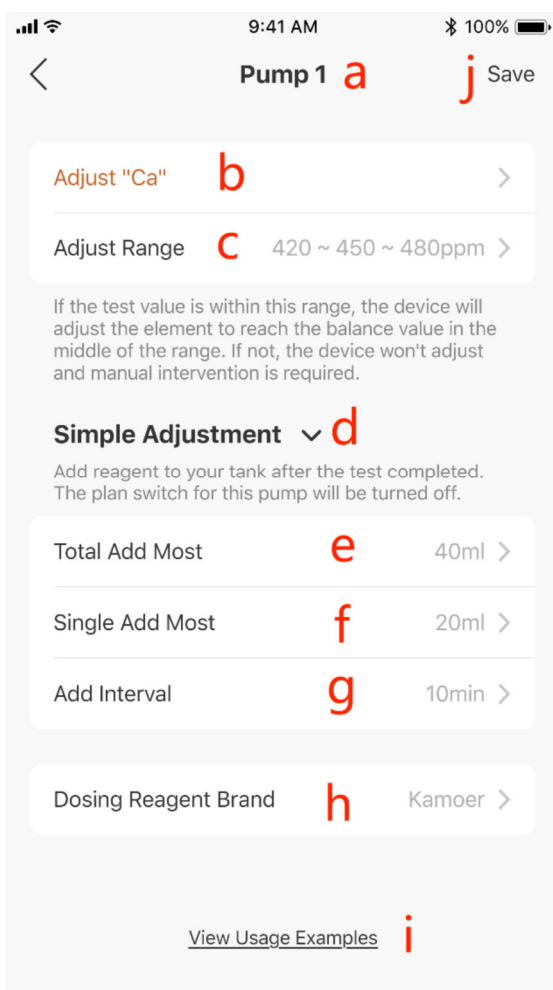
Use of Titration Equipment



- a. Added titration equipment, click to set parameters
- b. Click to add a new titration device. To add a new titration device, first bind it to the App, then connect the Reef Master and titration pump through KH Carer E1, and configure the binding according to the App's instructions
- c. Connection guide, you can refer to the guide to connect Reef Master and titration pump
- d. Communication address, wired communication address, used when binding Reef Master and titration pump
- e. The various channels of the titration pump; Each channel can be set to add supplementary parameters
- f. Jump to the titration plan, where you can set the addition plan for the titration pump

Simple Adjustment

Select and click on the titration pump channel that needs to be set, such as "Pump 1". After entering the channel adjustment setting interface, it will default to "Simple Adjustment" mode. Simple adjustment is to calculate the difference in concentration based on the volume of the cylinder and the current measurement value, and then calculate how much reagent should be added based on the concentration of the titrant. The element concentration in the aquarium is directly adjusted based on the amount of reagent added. This method is aimed at determining how many reagents can be titrated to increase the concentration level of elements in the cylinder. For nitrates and phosphates, as their consumption is not directly proportional to the dosage added, it is recommended to use a professional adjustment mode for more precise management.



- a. The name of the titration pump channel that needs to be set up
- b. Adjust parameters; Select the elements that need to be adjusted, that is, the elements that need to be added by the titration pump, and set one element for each titration channel
- c. Adjustment range; Set the ideal range of element concentration, with low and high values representing the minimum and maximum range of adjustment, and the middle value being the target concentration value; For safety reasons, automatic adjustment will only be activated when the Reef Master detects a parameter value within this range. Once the detected

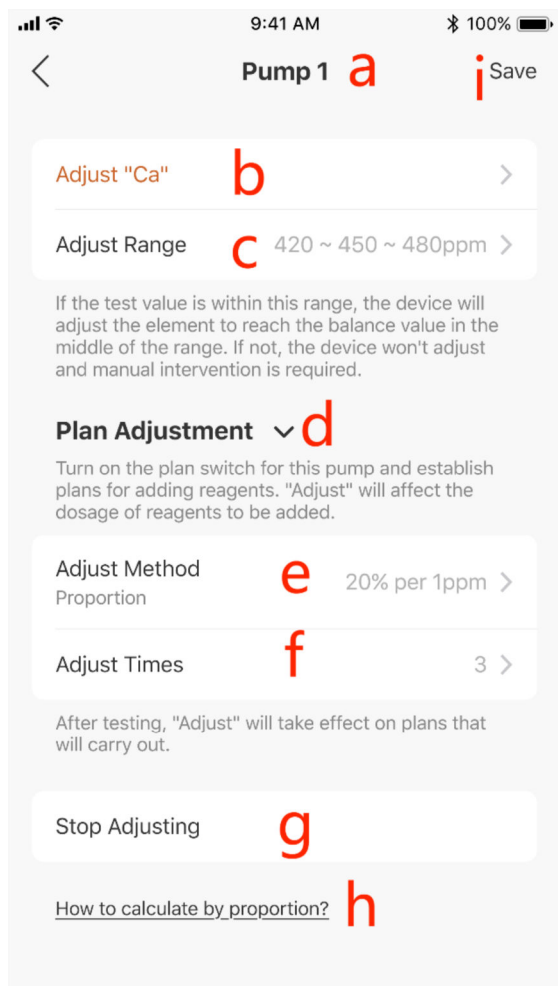
parameter value exceeds this range, automatic adjustment will not take effect

- d. Simple adjustment plan title; The default is a simple adjustment scheme, which can be switched to other schemes by clicking the drop-down arrow
- e. Set the maximum amount to be added; If the required amount of reagents exceeds the preset maximum amount, the system will add them according to the set maximum value to ensure safety and controllability
- f. Setting the upper limit of single addition quantity; If the total amount added is greater than this value, it will be added multiple times
- g. Add interval settings; If there are many additional elements, they need to be added multiple times, with a time interval between each addition
- h. Brand setting of titration reagents; Different titration reagents have different concentrations, and the amount of reagent required to increase by one unit is also different; Calcium magnesium KH titrant can be selected from Kamoer brand, while nitrate and phosphate should use other brands
- i. View examples; Users who are unsure how to use simple adjustments can refer to examples for understanding
- j. Save simple adjustment scheme settings; After saving, the plan switch for the corresponding pump head will be closed. If you exit without clicking save, the system will also pop up a reminder to discard the settings;

Plan Adjustment

Click the dropdown arrow next to Simple Adjustment to switch between plan adjustment mode.

Plan adjustment is when the user sets a titration plan in the titration pump, and the system affects



the amount of addition to this titration plan based on the detection value. When the detection value is within the adjustment range, adjust it according to the limited proportion, and the adjusted amount is added to the titration plan. The unit of adjustment range is displayed based on specific parameters. Considering the complexity of the plan adjustment mode, if you need to use this feature, please apply for permission to enable it from the manufacturer.

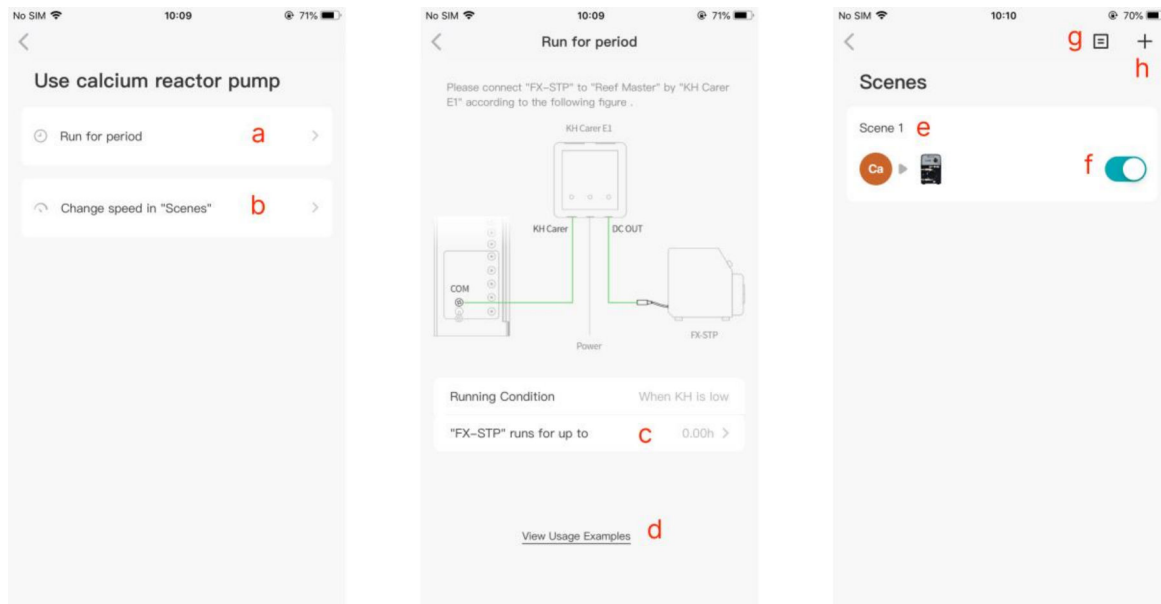
- a. The name of the titration pump channel that needs to be set up
- b. Adjusting parameters, just like simple adjustment
- c. Adjustment range, same as simple adjustment
- d. Title of professional adjustment plan; Same as simple adjustment, click the dropdown arrow to switch the adjustment scheme
- e. Adjustment method setting; There are two options, one is to adjust according to proportion, and the other is to adjust according to quantity; Proportional adjustment refers to adjusting the proportion of the titration plan based on the detected water quality parameters; Adjustment by quantity refers to adjusting a specific amount of added water based on the detected water quality parameters; Example:

- ① When the detection value of calcium and magnesium KH is high, it will affect the addition of less in titration to reduce calcium and magnesium KH;
 - ② When the detection values of nitrate, nitrite, and phosphate are high, it will affect the titration plan by adding more elements, which will reduce the levels of nitrate, nitrite, and phosphate
- f. The number of adjustments; This adjustment will be divided into several titrations to complete
 - g. Stop adjusting; When you want to stop the adjustment of the titration pump, you can use this function to operate it
 - h. View examples; For those who are unclear about the methods of adjusting according to quantity and proportion, they can refer to examples for understanding
 - i. Save plan adjustment settings; After ensuring all settings, click save. After saving, the plan switch for the corresponding pump head will be closed. If it is not saved and exits, the system will prompt whether to discard the settings

Use of Calcium Reactor Equipment

There are two ways to connect and control the calcium reactor. One is to connect the Reef Master and FX-STP calcium reactor pump through KH Carer E1, and adjust the water quality parameters by controlling the start and stop of the calcium reactor pump based on the detected value; One method is to adjust water quality parameters by linking cloud servers and adjusting the speed of the calcium reactor pump through detection values.

The reference for controlling the calcium reactor is the detection parameters of KH, and the start and stop of the calcium reactor pump are controlled based on the value of KH



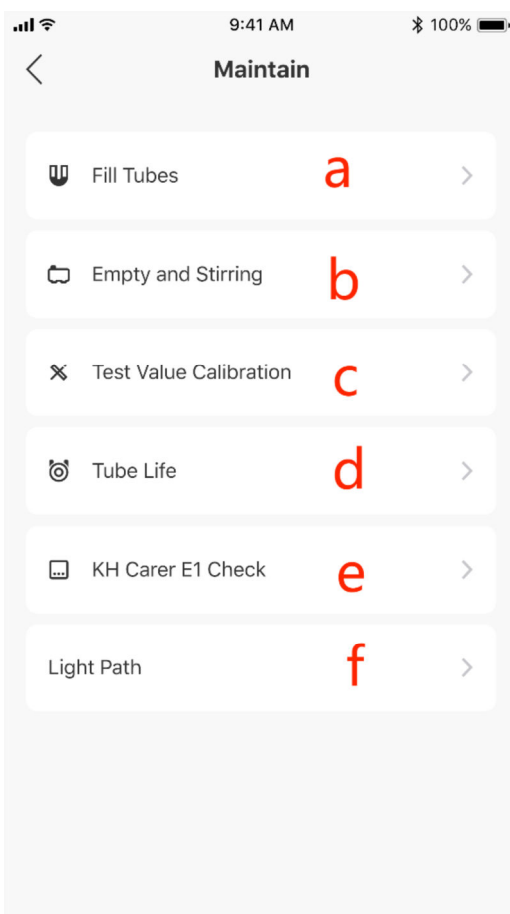
- a. Run for a period of time; This setting is achieved through the wired connection of KH Carer E1. It was detected that the KH was low, and the calcium reactor pump was controlled to run for a period of time
- b. Change speed in the scene; This is achieved through wireless control. The calcium reactor pump must be pre bound through the App, and then the speed of the calcium reactor pump can be adjusted by detecting the KH value
- c. The operating time of the calcium reactor pump; Set the operating time of the calcium reactor pump. When the KH value is detected to be too low, the Reef Master controls the calcium reactor pump to start running. When the pump exceeds this operating time, the calcium reactor pump stops running to prevent the occurrence of the calcium reactor pump being turned on for too long due to the long interval between two KH detections; If the KH value is detected to be appropriate within this duration, the calcium reactor pump will also stop
- d. View usage examples; Provide examples of the use of calcium reactor pumps
- e. The operating scenario of the calcium reverse pump created; The usage method is achieved through Reef Master and calcium reactor pump via wireless server
- f. Switch for scene control; Scene operation takes effect when the switch is turned on

- g. Running logs; View the log of calcium reverse pump operation here
- h. Create a scene; Create a scenario of a Reef Master variable speed calcium reactor, where multiple scenarios can be created to adjust the different speeds of the calcium reverse pump

Maintenance Function

The maintenance module includes pump maintenance, magnetic stirring maintenance, clamp valve maintenance, peristaltic pump operation, liquid filling and discharge, calibration, optical path inspection, etc., which can facilitate the maintenance of the Reef Master.

From System Settings ->Click Maintenance Function to enter the Maintenance Function interface. If the device is undergoing testing, it needs to be stopped before entering the function interface.



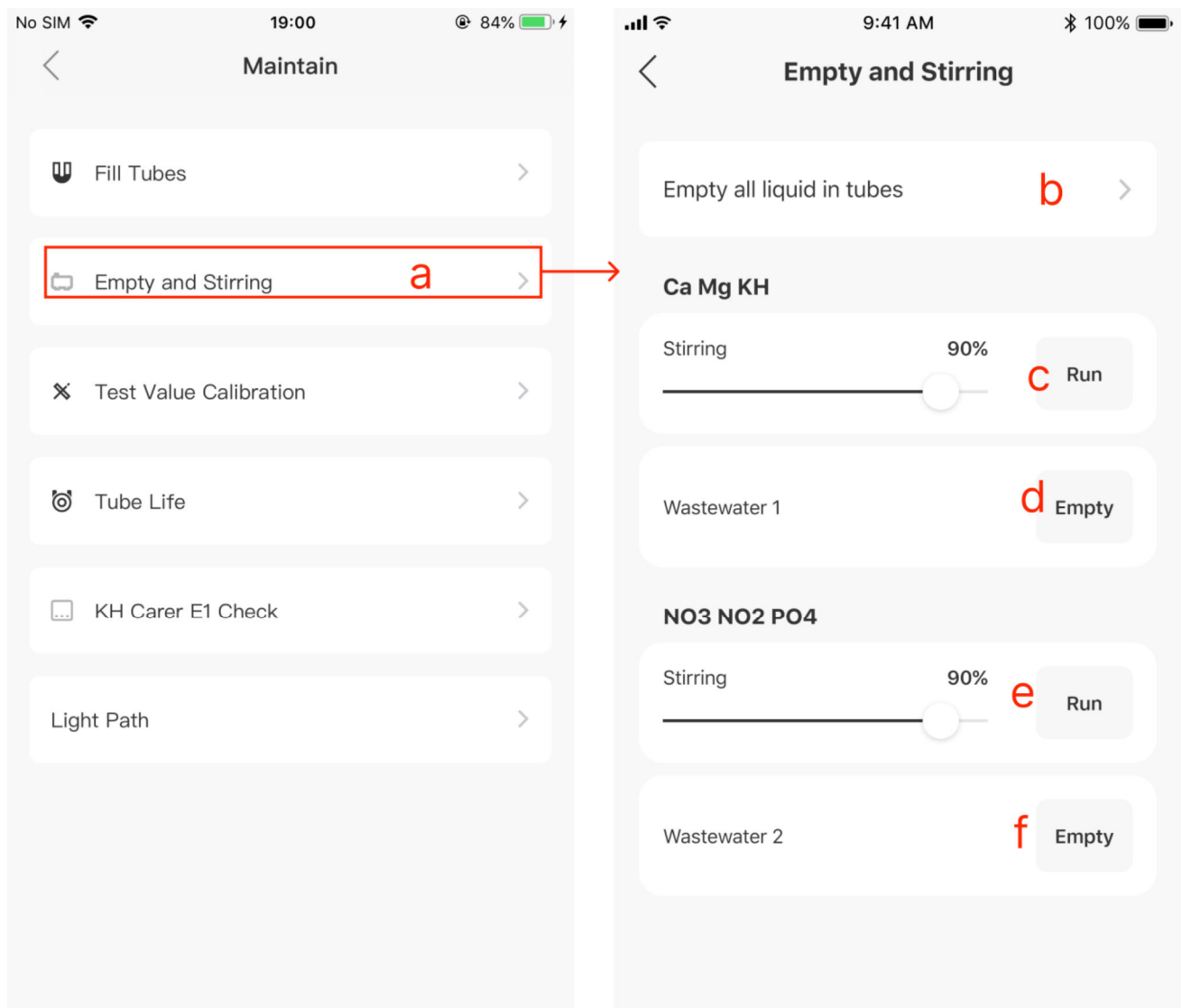
- a. **Fill Tubes:** In this module, you can fill the pump tube
- b. **Running pumps:** In this module, you can run clamp valves, pumps, magnetic stirring, etc
- c. **Test value correct:** The measurement results can be calibrated here, and the principle of calibration is to use standard solution to calibrate the measurement results of Reef Master. When there is suspicion that the device is measuring inaccurately, calibration can be performed to correct the device's detection
- d. **Tube Life:** Click to view the service life and duration of the pump tube, which can be reset to zero
- e. **KH Carer E1 Check:** Entering this module allows you

to check if the function of KH Carer E1 is normal.

Reef Master can control the F4 PRO titration pump or calcium reactor pump through KH Carer E1 linkage

- f. **Light Path:** Optical path inspection can check whether the circuit reading optical path sensor is normal

Empty and Stirring



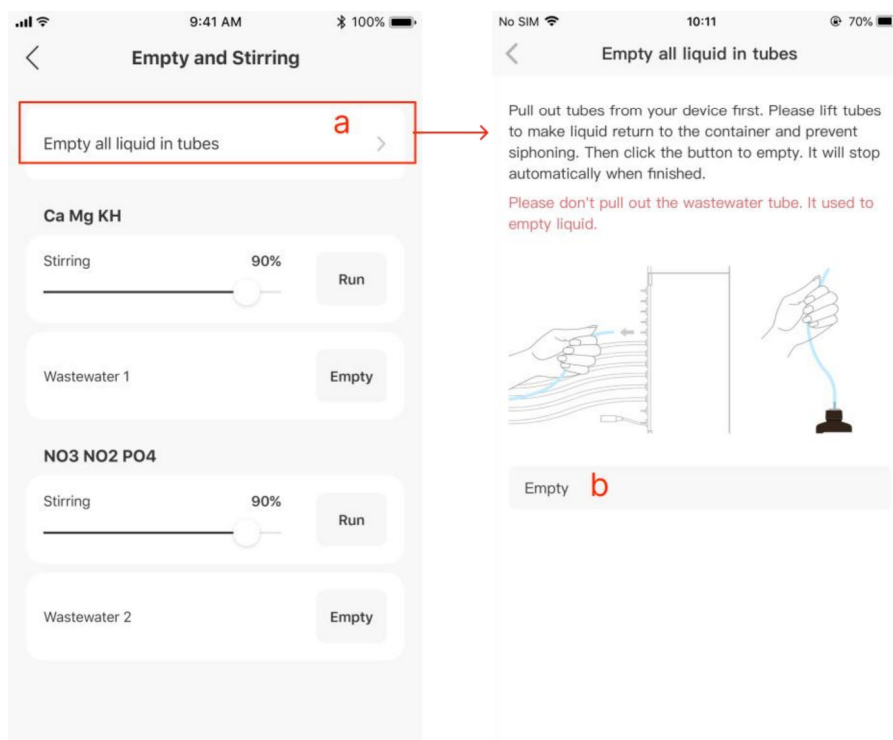
In the operation pump function, the reaction chamber can be emptied, and the stirring force of magnetic stirring can also be set

- Click to enter the function of Empty and Stirring
- Empty all liquids inside the tube; Click to enter the empty liquid guidance page

- c. Magnetic stirring setting of calcium magnesium KH detection module; The operating intensity and start stop control of magnetic stirring can be set, and the operating intensity range of magnetic stirring is generally between 40% and 60%
- d. Empty the waste liquid from the calcium magnesium KH reaction chamber
- e. Magnetic stirring settings for nitrate, nitrite, and phosphate reaction tanks; The operating intensity and start stop control of magnetic stirring can be set, and the operating intensity range of magnetic stirring is generally between 40% and 60%
- f. Empty the waste liquid from the nitrate, nitrite, and phosphate reaction tanks

Empty All Pipelines

When the equipment is not in use or is being transported, it is necessary to empty the liquid in the equipment pipelines and the connecting pipes outside the equipment to prevent the overflow of liquid in the equipment pipelines from affecting transportation or storage



- a. Empty all liquid in the pipeline. When the equipment is not in use, it is necessary to empty the liquid in the pipeline. Before emptying the liquid, unplug all pipelines except for the two waste liquid pipelines from the machine. When each pipeline is unplugged, lift the pipeline upwards to reflux the liquid in the pipeline into the reagent bottle or sea tank
- b. Click to clear all pipelines. Here, the liquid in the built-in pipelines and colorimetric dishes on the device is cleared. The waste liquid generated by clearing the pipelines is discharged from the waste liquid pipeline

Test Value Correct

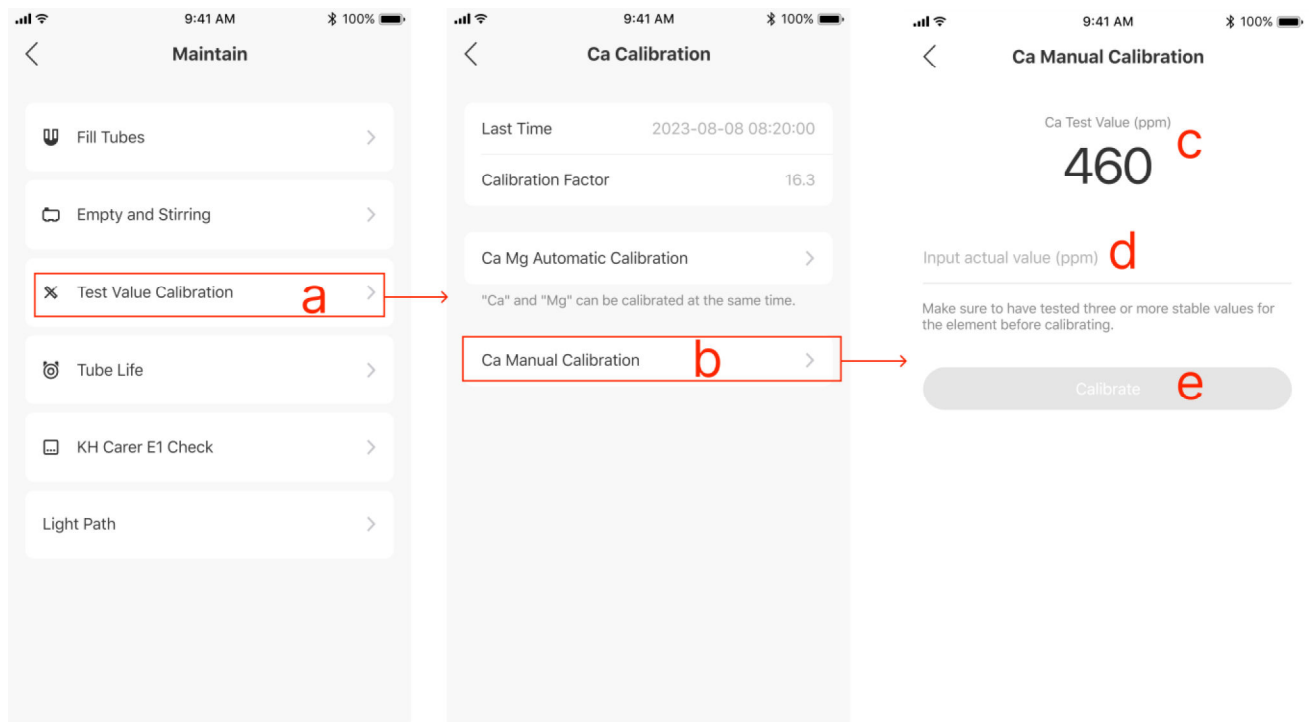
During the use of the equipment, if it is suspected that the detected values are inaccurate, calibration can be carried out. The principle of calibration is to use a standard solution to calibrate the detection results of the equipment. When the detection value of calcium and magnesium KH is not accurate, the detection value can be corrected. The corrected reference value can be the value of the test standard solution or the value of other considered accurate testing equipment. It is recommended to use the standard solution for calibration. There are two calibration methods: manual calibration and automatic calibration.

When manually calibrating, prepare the standard solution, such as using a calcium standard solution. First, connect the standard solution to the sample tube of the device, and then run the test through the App. One test is not enough, and it needs to be run several more times. After the data is stable, enter the value of the standard solution into the App in System Settings ->Maintenance ->Test Value Correction ->Manual Calibration to complete the calibration;

The calibration process is as follows:

1. Use standard solution instead of seawater and have Reef Master perform the test

2. After testing several stable values, enter the App and input the value of the standard solution into the App



- a. Click to enter the detection value correction process, select the parameters that need to be calibrated to correct them
- b. Select manual calibration on the parameter calibration page to enter the manual calibration operation interface
- c. Previously detected detection value
- d. Input actual detection value
- e. After completing the correction, the data will be synchronized to correct errors

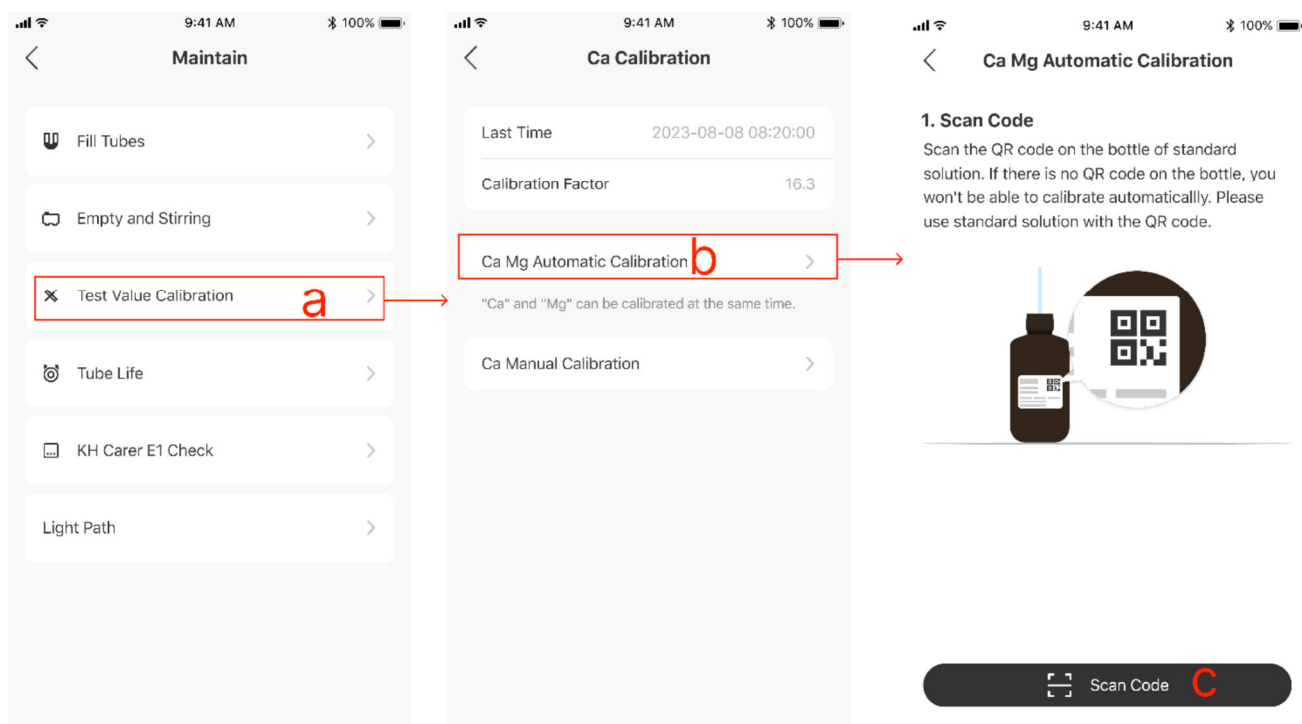
When performing automatic calibration, it is necessary to scan the QR code on the standard solution bottle, then follow the instructions to connect the standard solution to the device. After clicking start, the device will automatically perform the appropriate number of tests and correct it automatically after completion. Complete calibration in System Settings ->Maintenance ->Detection Value Correction ->Automatic Correction;

The calibration process is as follows:

1. Scan the QR code of the standard solution
2. After successfully scanning the code, connect the standard solution to the correct pipeline
3. After the connection is correct, start the correction. The device will automatically perform several tests and wait patiently
4. After the test is completed, the interface prompts completion and the system automatically corrects it

Note: If automatic calibration cannot be performed without a QR code, please use a standard solution with a QR code;

Please carefully read the prompts and ensure that there is sufficient margin of standard solution.

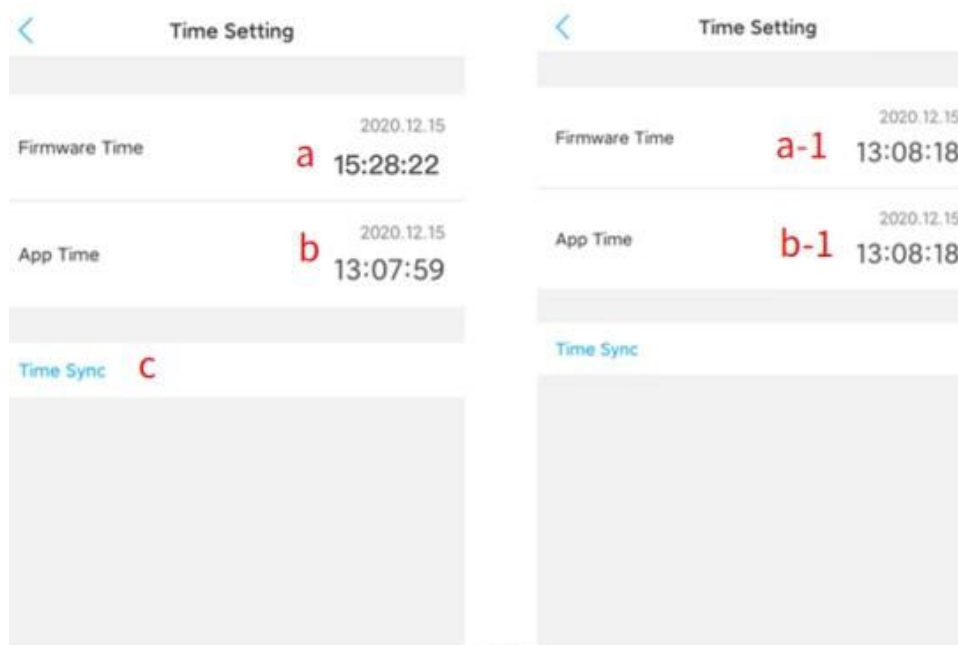


- a. Click to enter the detection value correction process, select the parameters that need to be calibrated to correct them

- b. Select automatic calibration on the parameter calibration page to enter the automatic calibration operation interface
- c. Once the calibration parameters are determined, the corresponding standard solution can be scanned

Time Setting

When the time of the device does not match the local time, the real-time clock time of the device can be synchronized through the app to ensure the normal execution of the device titration plan.



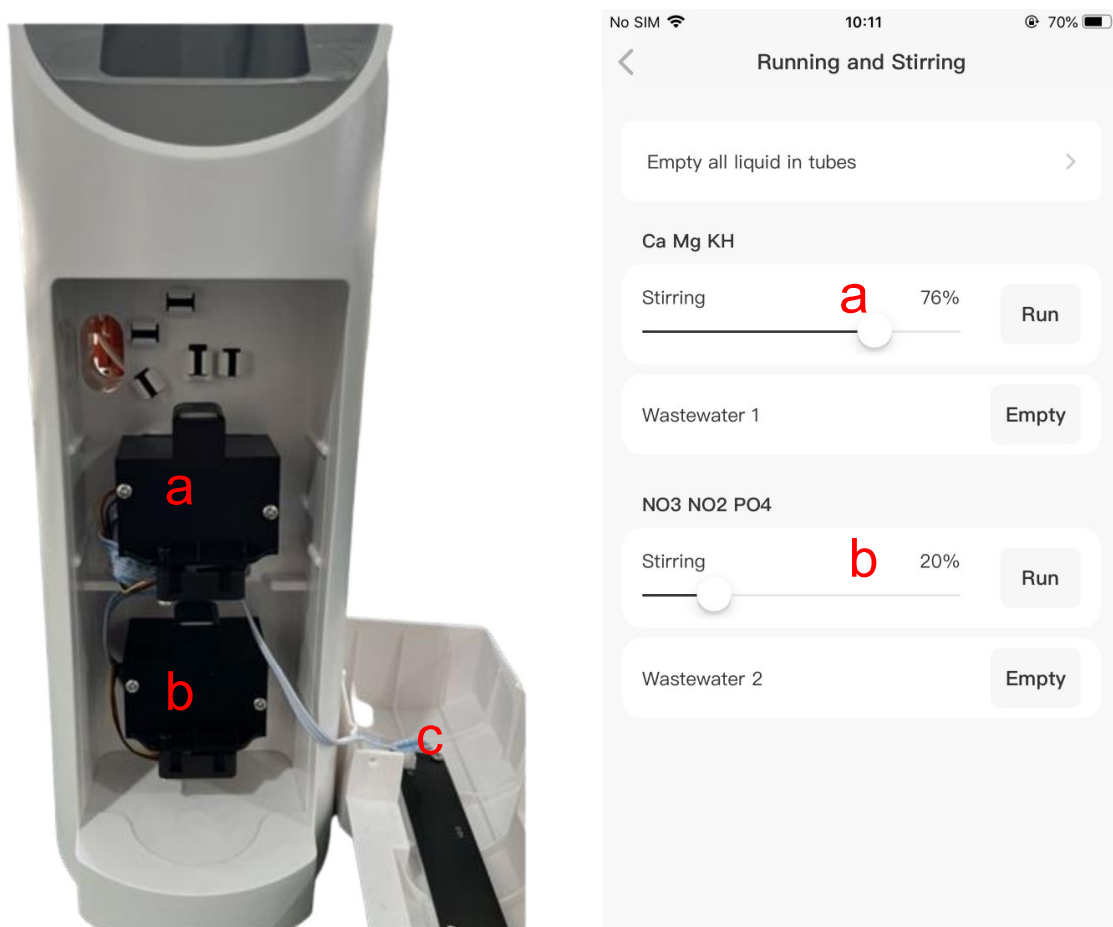
- a. **Firmware Time:** This displays the current real-time clock time of the device;
 - b. **App time:** The current time of the phone;
 - c. **Time synchronization:** After clicking, the device will start time synchronization. After time synchronization, the device's running time will be the same as the phone's time;
- a-1** and **b-1** correspond to the device's real-time clock time and mobile phone time after time synchronization, respectively;

Equipment Maintenance

Equipment Maintenance

Magnetic Stirring

When encountering the problem of abnormal noise in magnetic stirring, when troubleshooting, first remove the front cover C of the Reef Master shown in the figure below. Go to System Settings ->Maintain ->Running Pumps to enter the control interface for Running and Stirring.



- Calcium magnesium KH reaction chamber and magnetic stirring control
- Nitrate, nitrite, phosphate reaction tanks and magnetic stirring control
- The front cover of the Reef Master should be removed first during inspection, and two reaction chambers can be seen

Each reaction chamber contains a magnetic stirrer, which operates during water quality parameter testing;

Magnetic stirring has abnormal noise, which may be due to a change in the magnetic force of the magnetic stirring. The problem can be solved by setting different magnetic stirring forces on the App. Generally, the operating force of magnetic stirring is between 40% and 60%, and the factory default setting is 60%. If there is abnormal noise during the operation of magnetic stirring, the strength of magnetic stirring can be reduced, such as adjusting it to 40%;

Appendix

Appendix

Technical Parameters

Size(L x W x H)	230 x 120 x 338 mm
Weight	Approximately 3350 g (excluding power adapter)
Power	Input: 100VAC -240VAC, Output: DC24V 2A
interface	WIFI, Bluetooth, CAN (backup)
Working environment	Temperature 0-70 °C, humidity 10% -90% (non condensing)
Storage environment	Temperature -20°C~85°C, humidity 10%-90% (non-condensing)

After sales warranty information

1. Warranty conditions

The free service during the warranty period is only valid under normal use and maintenance according to the user manual, and any man-made faults or damages are not covered by the warranty. Please keep the purchase invoice and user manual properly, so that you can receive satisfactory after-sales service in a timely manner.

2. Warranty scope

Within **one year** from the date of purchase, if any damage occurs due to manufacturing processes or components, our company will provide free warranty services.

The free maintenance service provided during the warranty period includes free repair, free supply and replacement of faulty parts. Products that cannot be repaired will be replaced with products of the same model (if the model has stopped production, it will be the same model). Free services do not include transportation costs incurred for product repairs.

3. Non warranty coverage

The following factors are not covered by the free warranty, and customers are required to pay for repairs.

- 1) Product appearance (please confirm at the time of purchase);
- 2) Improper use, maintenance, or storage (please use, maintain, and store correctly according to the user manual);
- 3) Connect to inappropriate power supply;
- 4) Damage to components caused by circuit board short circuits caused by the entry of various insects into the machine;

- 5) Losses caused by accidents;
- 6) Using inappropriate spare parts (not applicable to non company spare parts);
- 7) Negligent handling, modification, or repair by personnel not authorized by our company
(please do not disassemble or repair without authorization);
- 8) Failure or damage caused by use outside of the applicable scope;
- 9) Damage caused by force majeure, etc;
- 10) Consumable and vulnerable parts (such as pH electrodes, ORP electrodes, etc.);
- 11) The warranty period has expired.



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