AQUARINO

KH

USER MANUAL



Alkalinity measurement and control
for marine aquariums

Contents

Preface
How to use this manual

PART I Getting to know your Aquarino KH
1 What the Aquarino KH is
2 How the Aquarino KH measures
3 In the box, and the parts

PART II Installation
4 Where and how to install
5 Installing the pH probe

PART III The Aquarino app
6 Installing the app and creating your account
7 Adding your Aquarino KH
8 Getting around the app
9 Sharing access

PART IV Calibration
10 Full calibration
11 Partial calibration
12 The pH probe: calibration and health
13 What interferes with the measurement

PART V Putting it to work
14 Target alkalinity, frequency and alerts
15 Monitoring mode
16 Alkalinity Doser
17 Calcium reactor through the CO2 Port
18 Integrating with other equipment
19 The first seven days

PART VI Getting to know the screens
20 Home screen
21 Graphs
22 Logs
23 Custom. — preferences
24 System and Status

PART VII **Maintenance and support**

25 Maintenance routine

26 Troubleshooting

27 Frequently asked questions

28 Specifications

29 Support and warranty

Preface

Like every aquarist, I looked for what was best for my fauna and flora; it took a lot of equipment, products and study.

After buying several devices to monitor, control and help me care for my aquarium, I realised that none of them met my needs perfectly. There was difficult setup, high cost and plenty of limitations.

So I decided to use my knowledge of technology, and my own resources, to offer our hobby a new option. That is the moment Aquarino was born.

I am very proud of what we have built. Many aquarists took an active part, sending suggestions. We only reached this result because you believed in the project.

What we want to keep as the essence of Aquarino is direct contact with aquarists, close support and service, and speed in delivering new features and products.

Join our channels to ask questions, send suggestions and talk about the hobby:

- WhatsApp: https://chat.whatsapp.com/Hp9GjAmptpUEzbykjlUCMC
- Facebook: https://www.facebook.com/AquarinoController
- YouTube: https://www.youtube.com/c/aquarino

Aquarino depends on all of us to move forward and become a reference in usability, features and service for aquarists worldwide.

Thank you! We will repay your trust, and take our hobby to a new level.

Laercio M F Junior

Founder and Director of Innovation, Aquarino

How to use this manual

This manual is meant to be read in order the first time, and consulted by topic afterwards. If your Aquarino KH has just arrived, follow Parts II, III and IV in sequence — in a little over an hour it will be measuring.

Four kinds of highlight appear throughout the text:

> BACKGROUND
> Explains the reasoning behind a recommendation. Reading it is optional, but it helps you make better day-to-day decisions.

> TIP
> A practical suggestion that saves time or improves the result.

> CAUTION
> A situation that can harm the measurement, the equipment or your aquarium. Worth reading.

> EXAMPLE
> A concrete case with numbers, to make the concept stick.

The screenshots were taken in the app, on a phone, which is how most aquarists use the Aquarino KH day to day.

> BACKGROUND
> **The screens in this manual**
> The Aquarino KH is updated frequently, and the manual follows every update. Small visual differences between the images and your screen are expected and do not indicate a problem.

PART I

Getting to know your Aquarino KH

What the equipment does, what to expect from it and what is in the box.

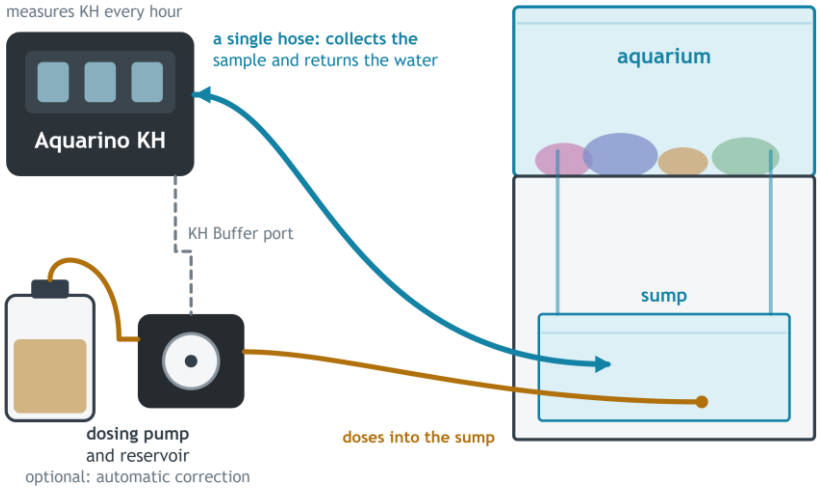
1 What the Aquarino KH is
2 How the Aquarino KH measures
3 In the box, and the parts

CHAPTER 1

What the Aquarino KH is

The **Aquarino KH** is an alkalinity (KH) meter and controller for marine aquariums. It measures your aquarium's alkalinity automatically and continuously — **no reagents, no refills and no cost per measurement** — and, if you want, corrects the KH on its own within the limits you define.

Instead of a chemical test done whenever you remember, the Aquarino KH gives you a time series: up to **24 measurements a day**, all recorded, with graphs, an event log and e-mail alerts.



The set in the system: the Aquarino KH connected to the aquarium through the sampling line and, if you want automatic correction, the external dosing pump with the buffer reservoir.

1.1 What it does

- **Measures** your aquarium's alkalinity at the interval you set, from 1 to 24 times a day.
- **Alerts you** when KH leaves the range you consider ideal — by e-mail, by sound alert and through the panel LED.
- **Replenishes and corrects alkalinity** with the Alkalinity Doser: an external dosing pump with the alkalinity product you already use — buffer, 3-in-1 balling or an _all-in-one_ solution.
- **Corrects downward**, controlling the CO2 solenoid — or the peristaltic pump — of your calcium reactor.
- **Records** every measurement, every dose and every decision, with export to a spreadsheet.

- **Passes the value on** to other equipment, through the KH-OUT port or the Aquarino Controller integration.

1.2 What it does not do

Being clear about the limits of the equipment is part of using it well.

- It **does not dose calcium, magnesium or other elements on its own**. The Alkalinity Doser can be your aquarium's alkalinity replenishment (Chapter 16); if you use a calcium reactor or other dosing pumps, they remain the replenishment, and the doser only tops up whatever is missing.
- It **measures and decides on alkalinity alone**. Calcium, magnesium and other elements are not measured and play no part in the dosing decision — although they may be replenished alongside, depending on the product you use (see the note below).
- It **does not fix an undersized system**. If the reactor has run out of CO2 or the balling is underdosed, the Aquarino KH shows the problem clearly in the graph and in the event log, but solving it is up to you.
- It **does not replace your chemical test**. That test is the anchor of calibration — see Chapter 10.

BACKGROUND

What if I use a 3-in-1 solution?

With an _all-in-one_ solution — **All For Reef**, for example — every dose delivers calcium, magnesium and trace elements along with alkalinity. Since the Aquarino KH drives dosing by KH, those elements end up being replenished **at the pace of alkalinity consumption**, which is exactly the logic these products were formulated around.

In other words: the equipment still sees only KH, but the practical effect of the correction goes further. What guarantees the ratio between elements is the product, not the equipment — keep tracking calcium and magnesium with your own tests.

BACKGROUND

Why there is a maximum daily correction

The equipment has a safety stop: correction never moves alkalinity, up or down, beyond the value set in **Maximum daily correction** within 24 hours. The factory default is 0.15 dKH per day.

This is not a technical limitation — it is protection. An abrupt alkalinity correction is usually more harmful to corals than the deviation it is trying to fix. Stability is worth more than speed.

1.3 Who it is for

Your system	How the Aquarino KH helps
Balling with several dosing pumps	Monitoring and alerts. You adjust your doses with real data instead of guesswork, and still have the Alkalinity Doser to top up whatever is missing on the day a dosing pump fails.
3-in-1 balling (single dose)	The Alkalinity Doser as your replenishment: it replaces consumption hour by hour and keeps KH on target. This is the scenario where the equipment comes closest to running on its own.
Calcium reactor	Control of the CO2 solenoid through the CO2 Port. You set the bubble counter once and the equipment handles the fine adjustment hour by hour.
Aquarium without automatic replenishment	Continuous monitoring and history, so you know when and how much to step in manually.

CHAPTER 2

How the Aquarino KH measures

2.1 Measuring without reagents

The Aquarino KH uses a **patented method** to track the changes in your alkalinity, taking as its basis a reference alkalinity that you provide beforehand.

In practice this has two consequences that are worth half of this manual:

- Since no reagent is consumed, measuring **costs nothing** — you can measure every hour, every day, indefinitely.
- Since the method starts from a reference **you** provide, measurement quality depends directly on the quality of that information. That is why calibration gets a chapter of its own and is the most important step of the installation.

> IMPORTANT
>
> **Calibration is the foundation of everything**
>
> If the reference value is wrong, **every** measurement that follows carries that error — the equipment will repeatably measure a number that is offset. Use a chemical test you trust and follow Chapter 10 without skipping steps.

2.2 The measurement cycle

Each measurement takes about **30 minutes**, and you follow the progress live, as a percentage and a time remaining, on the home screen.

Stage	What happens
Preparation	The internal chambers are emptied and rinsed
Collection	A fresh sample is drawn from your aquarium
Aeration	The chambers are aerated until they stabilise
Reading	The probe takes the required readings
Result	KH is calculated, recorded and displayed
Close-out	Alerts are sent and the correction for the period is decided

Throughout the cycle the equipment keeps responding normally in the app, and your calcium reactor carries on with the plan set at the previous measurement — nothing sits idle waiting for the result.

> **CAUTION**
> **Power loss during a measurement**
> If power fails mid-cycle, the equipment discards the sample in progress — about 40 mL — so that water from different stages is never mixed. Frequent power cuts gradually lower the internal level. If you notice the reservoir running low, run a full calibration (Chapter 10).

2.3 What the measurement needs in order to work

Four conditions explain almost every case of unstable readings that reaches our support desk:

Condition	Why
Equivalent aeration in both chambers	This is the most frequent one. The side valves should leave both chambers with strong, similar airflow. The acceptable minimum is around 5 mm of foam.
Clean chambers	Dirt, biofilm and settled organic matter change the reading progressively and silently.
Stable temperature	A sharp swing during the cycle shifts the result. Hence the recommendation not to install near a chiller.
A representative sample	The hose tip needs to sit in water that has already mixed with the rest of the system — not next to the balling dosing point, not in the detritus at the bottom.

2.4 The pH probe: what actually matters

The pH probe is the most delicate part of the set, and the one that most affects confidence in the readings. Two things are commonly confused:

	What it is for	Needed to measure KH?
Probe **calibration** (pH 7 and pH 10)	Displaying the **real pH of your aquarium** on screen and in the graph	No
Probe **health** (a 0 to 100% index)	Telling you whether the probe is still reliable — it considers signal noise, slope, offset and probe age	Yes, this is what counts

In other words: you could never calibrate the probe and KH would still be measured. Without calibration, only the **Tank pH** field stays empty and the pH series is not recorded in the graph.

> **TIP**
> Watch the **Probe Health** indicator on the home screen, not the date of the last calibration. That is what tells you when the probe needs replacing. Chapter 12 covers the ranges and what to do in each one.

CHAPTER 3

In the box, and the parts



The Aquarino KH.

3.1 What comes in the box

- Aquarino KH;
- Universal-voltage 12 V / 5 A power supply;
- 5 × 3 mm silicone hose with sinker, to connect the equipment to the aquarium;
- pH probe with BNC connector;
- pH 7.00 and pH 10.00 calibration solutions.

BACKGROUND

The calibration solutions come with the product because calibrating the pH probe is part of the installation — you do not need to buy anything separately to get started. The procedure is in Chapter 12.

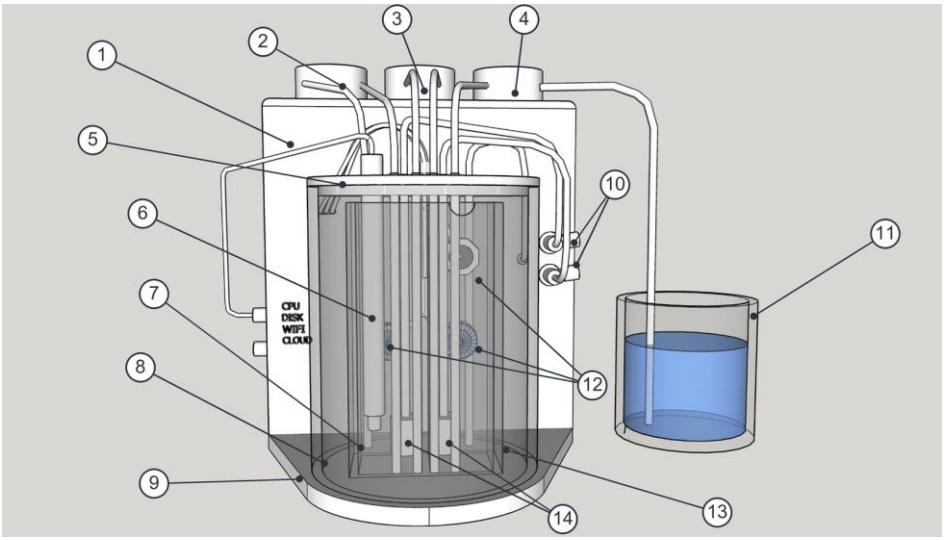
TIP

Options worth having

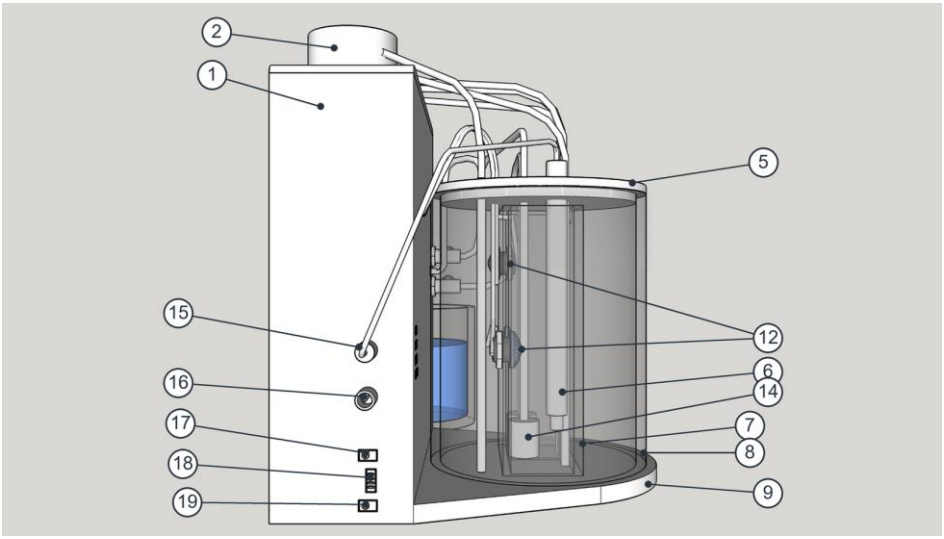
External dosing pump — needed only if you want automatic upward correction (Chapter 16).

Light shield — recommended if the equipment is exposed to aquarium or sun light. It prevents algae growth inside the chambers, which affects measurements over time.

3.2 Getting to know the parts



Cutaway view, with numbered parts: internal chambers, dosing pumps and the line running to the aquarium.

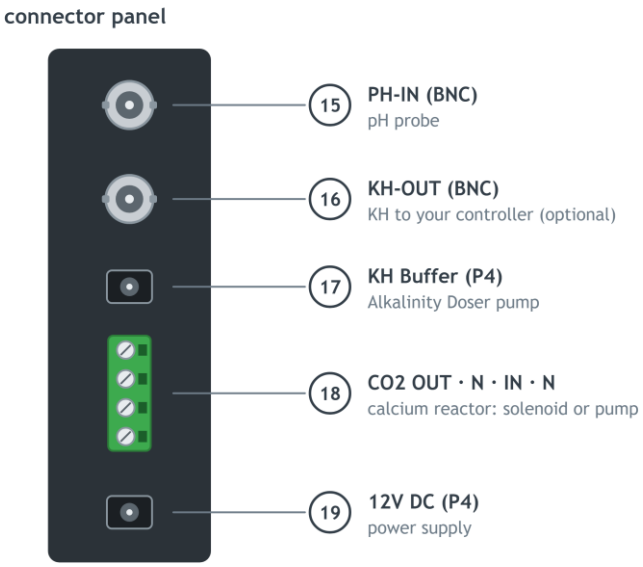


Side view: the internal layout and, on the panel, the connectors — items 15 to 19 of the connector panel table.

No.	Part	Function
1	Acrylic structural case	Structure and protection of the assembly
2	Reference dosing pump	Moves the reference water
3	Transfer dosing pump	Moves the sample between chambers
4	External tank dosing pump	Draws the sample from your aquarium and returns the water
5	Reservoir lid	Access for cleaning
6	pH probe	Takes the readings used to calculate KH
7	Measurement reservoir	Chamber where the aquarium sample is analysed

No.	Part	Function
8	Reference reservoir	Chamber holding water of known alkalinity
9	Reference tank support base	Support
10	Airflow control valves	Fine adjustment of each chamber's aeration
11	External tank	Your aquarium or sump
12	Level sensors	Detect the presence of water in the chambers
13	Transfer chamber	Intermediate stage of the cycle
14	Air stones	Diffuse air inside the chambers

Connector panel



The side panel holds every connection on the equipment.

No.	Connector	What it is for
15	**PH-IN** (BNC)	Input for the pH probe supplied with the equipment
16	**KH-OUT** (BNC)	Optional output: delivers KH to your aquarium controller through its pH interface (Chapter 18)
17	**KH Buffer** (P4)	Output for the Alkalinity Doser's external dosing pump (Chapter 16)
18	**CO2**	Switch for the CO2 solenoid or the peristaltic pump of the calcium reactor. Terminals, top to bottom: OUT, N, IN, N. It does not supply power: power comes in through IN (Chapter 17)

No.	Connector	What it is for
19	**12V DC** (P4)	Power, through the supply that comes with the product

Panel lights

Four indicators show the state of the equipment without you having to open the app:

LED	Meaning
CPU	The equipment is processing normally
DISK	Memory card activity
WIFI	Connected to your Wi-Fi network
NET	Internet access and Aquarino cloud reachable

There is also a colour LED that sums up the state of the equipment without a screen:

Colour	Meaning
Green	KH within the range set by target and margin
Blue	KH below the range
Red	KH above the range
White	Measurement in progress

If you prefer the equipment discreet, all LEDs can be switched off on the Custom. screen (Chapter 23).

PART II

Installation

The right spot on the bench, the water line and the pH probe.

4 Where and how to install

5 Installing the pH probe

CHAPTER 4

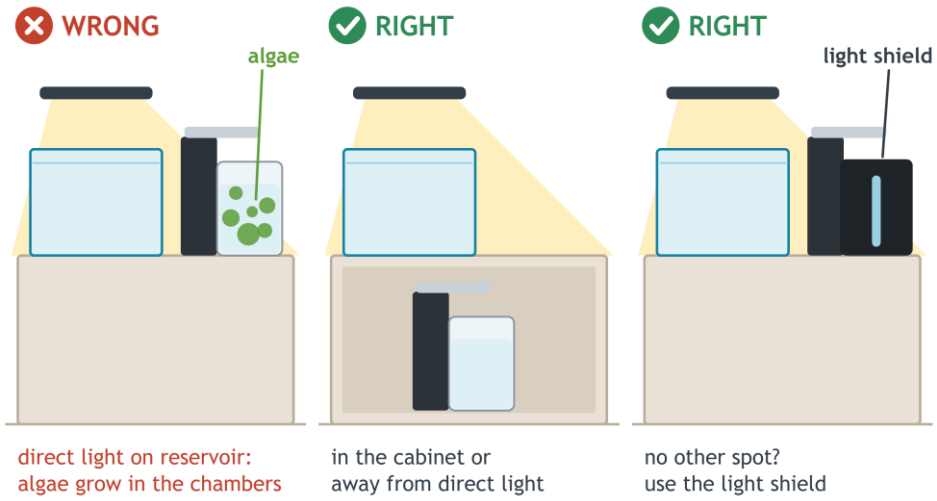
Where and how to install

4.1 Where to install

Place the Aquarino KH on a flat, dry, easily reached surface intended for electronic equipment. You will come back to this spot for maintenance — leave room to open the lid comfortably.

Avoid these four places, because all of them degrade measurement quality:

Avoid	Why
Under aquarium lighting or direct sunlight	Algae grow inside the chambers and change readings over the weeks
Near a chiller or any heat source	A sharp temperature swing during the cycle affects accuracy
Over the water line or anywhere it gets wet	This is electronic equipment; constant splashing shortens its life
A room with no ventilation at all	Very still air increases the spread between measurements



The most common mistake is placing the equipment next to the aquarium, under the same light: algae grow in the transparent reservoir. The ideal spot is inside the cabinet or somewhere without direct light; if the only available spot gets light, use the light shield.

TIP

Light shield for the Aquarino KH

If the only available spot gets light, use the **light shield**: a black cover that fits over the outside of the reservoir and blocks the light, with a slit so you can still see the water level. It is far cheaper than cleaning the chambers every month.

Available at https://www.aquarino.com.br/pagina-de-produto/protetor-luz-para-o-aquarino-kh

4.2 Connecting the sampling hose

1. Connect the silicone hose to the Aquarino KH, on the **right-hand** fitting of the **Tank** dosing pump.
2. Run the other end to your sump or aquarium. The sinker supplied with the hose keeps the tip submerged.



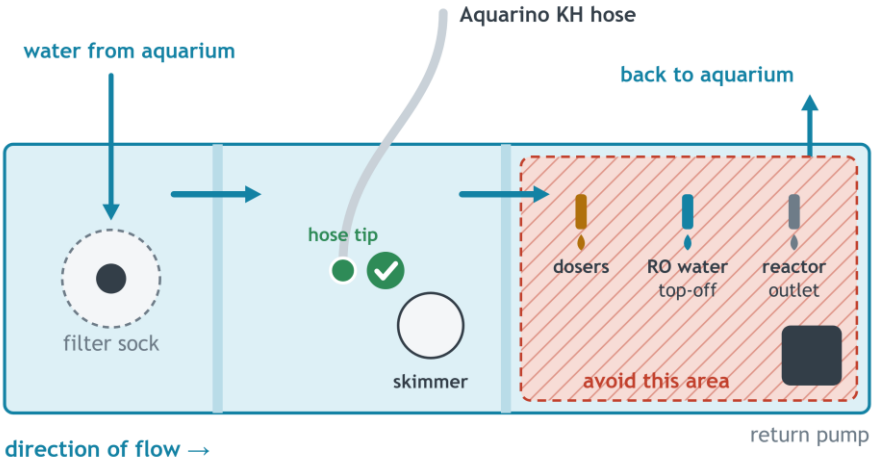
The sampling hose goes into the right-hand fitting of the Tank pump.



The sinker holds the hose tip steady inside the sump.

Where to leave the hose tip

Every sump has a **direction of water flow**: water arrives from the aquarium, passes through the chambers and goes back through the return pump. The points where something enters the system usually sit along that path — the dosing pump outlets, the reverse-osmosis top-off that makes up for evaporation, and the calcium reactor outlet. Right after these points, and close to them, the water has not yet mixed with the rest of the system.

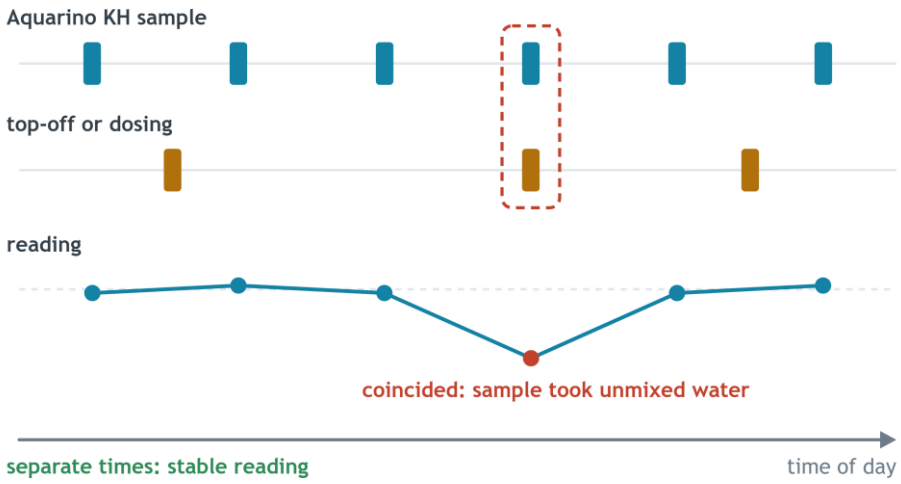


Sump seen from above. Leave the hose tip before the dosing points, in the direction of flow, and away from them: there the water has just arrived from the aquarium and represents the system.

So leave the hose tip **before these points, in the direction of flow, and away from them**, in a spot with good flow. Also avoid the bottom of the sump, where detritus settles, and the skimmer outlet: organic matter drawn into the equipment affects measurements and fouls the chambers.

Why the position changes the reading

The problem shows up only now and then, which is why it is hard to notice. If the time of a sample happens to coincide with a reverse-osmosis top-off or with a dosing pump switching on, the sample takes in water that has not yet mixed: more diluted, in the case of the top-off, or more concentrated, in the case of the buffer. That one reading falls off the curve, while the others remain normal.



Diagram, without numbers: as long as the samples fall at different times from the top-offs and dosings, the reading stays stable. When they coincide and the hose is close to the dosing point, that reading falls off the curve.

CAUTION

Readings that swing for no apparent reason

If the graph shows isolated points off the curve, first check where the hose tip is. If it is close to the dosing pump outlets, the reverse-osmosis top-off or the reactor outlet, move the tip to before these points, in the direction of flow.

CHAPTER 5

Installing the pH probe

The pH probe is delicate and needs careful handling. Set aside a few minutes and follow the steps calmly.

3. Remove the silicone protective cap from the probe. Place the probe in a cup of water from your aquarium to rinse it.
4. Connect the probe's BNC to the side input marked **PH-IN**.
5. Carefully insert the probe into the measurement compartment of the Aquarino KH.



Step 1 — remove the protective cap and rinse the probe.



Step 2 — connect the BNC to the PH-IN input.



Step 3 — insert the probe into the measurement compartment.

IMPORTANT

Four rules that preserve your probe

Never let the probe dry out. More than 30 minutes exposed to air can damage it permanently.

Never use reverse-osmosis, distilled or deionised water. Not for rinsing, and not for storing the probe. Water with no dissolved salts pulls ions out of the glass bulb and out of the reference electrolyte: the probe starts to respond slowly, the reading drifts and the service life gets shorter. Use **drinking water** — straight from the tap is fine.

Never rub the bulb. Rinse it and, to dry it, just dab it with soft paper — no rubbing and no cloth.

Plan the replacement. Nominal service life is **12 months**. After that the reading degrades even if the probe seems to work.

TIP

As soon as you install the probe, record the date in **Configuration → pH Probe → Log probe replacement**. The equipment then counts the days in use and reminds you to replace it at the right time (Chapter 12).

PART III

The Aquarino app

Creating your account, adding the equipment and sharing access.

6 Installing the app and creating your account

7 Adding your Aquarino KH

8 Getting around the app

9 Sharing access

CHAPTER 6

Installing the app and creating your account

Everything you do with the Aquarino KH happens through the **Aquarino app**, available for Android and iPhone. It is how you add the equipment, follow the measurements and change settings — at home or anywhere else.

6.1 Installing the app

Search for **Aquarino** in your phone's app store and install it. The same app serves the whole product line — Aquarino KH, Controller and Display.

6.2 Creating your account

When you open the app for the first time, tap **Create an account** and fill in:

Field	What to enter
Name and **Surname**	How you want to be identified in the app
Telephone	With the country code. Used by support to reach you
Email	An address you actually check — this is where the activation PIN and every equipment alert will arrive
Password and **Confirm password**	See the requirements below

Password requirements

- 8 to 60 characters;
- at least one uppercase letter;
- at least one lowercase letter;
- at least one number;
- at least one special character.

The app shows the requirements on screen and ticks each one off as you type.

6.3 Activating the account

Once you have signed up, you receive a **6-digit activation PIN** by e-mail. On the **Activate account** screen, type the code into the six boxes and tap **Activate account**.

TIP

E-mail did not arrive? Check your spam and junk folders. If it still has not come through, use **Resend activation PIN** — the app sends a new code and invalidates the previous one.

CAUTION

Without activation the account is not released. Keep track of the e-mail you registered: it is what links your equipment to your account, and what support uses to identify you.

6.4 First sign-in

On your first sign-in the app offers two optional features that are worth enabling:

Feature	What it is for
Enable biometric lock	Requires your fingerprint or face to open the app. Recommended, since the app commands equipment on your aquarium
Enable push notifications	Alerts arrive straight on the phone, in addition to e-mail. It is the fastest way to learn about an off-target KH or an empty reservoir

Once you have chosen, tap **Start app**.

TIP

Forgotten password

On the sign-in screen, tap **Forgot password?**. You receive a recovery PIN by e-mail and set a new password — the same mechanism as activation.

CHAPTER 7

Adding your Aquarino KH

The app has a wizard that handles the whole process: it talks to the equipment, hands over your Wi-Fi password and registers it in your account. Six steps, a few minutes.

7.1 Before you start

- The Aquarino KH should be **assembled and plugged in** (Chapters 4 and 5);
- Have your **Wi-Fi network name and password** at hand;
- Stay **close to the equipment** during the process;
- Confirm your network is **2.4 GHz** — see section 7.4.

7.2 The wizard, step by step

1 · Device type

Choose **Aquarino KH** from the list of devices.

2 · Prepare your device

The app asks you to switch the equipment on and wait for **two signals**: first the **startup beep**, then confirmation that the **green Wi-Fi LED is blinking**. That blinking is what tells you the Aquarino KH is ready to be configured.

The screen itself shows the three LEDs for you to check — CPU, Disk and WiFi — and asks whether the green one is blinking. If it is, carry on; if not, unplug the equipment, plug it back in and wait again.

> CAUTION
> If the Wi-Fi LED still does not blink after a restart, the equipment is probably already configured on some network. In that case it will not open the temporary network — see section 7.3.

3 · Connect to Aquarino

The equipment creates a **temporary Wi-Fi network** called **AquarinoKH**, and the app lists it under *Available networks*. You need to connect your phone to it:

6. Tap **Open Wi-Fi Settings** — the app takes you straight to your phone's settings.
7. Select the **AquarinoKH** network.
8. Return to the app and tap **I am connected**.

CAUTION

The "no internet" warning is expected

That network has no password and no internet access — it exists only during setup, so the phone can talk directly to the equipment. When your phone warns you the network is offline, **choose to stay connected**.

If the phone leaves the network on its own, it falls back to your home network and the wizard cannot continue. Turn off automatic network switching in your Wi-Fi settings before you start.

BACKGROUND

On iPhone, the system asks permission for the app to join the network — tap **Join**. That is an iOS permission, not an Aquarino one.

4 · Network

Back in the app, the **Network** screen asks you to pick the network the equipment will use day to day. Choose **your Wi-Fi network** from the dropdown, enter the **password** and tap **Configure**.

TIP

The list shows what the **equipment** can see from where it sits — not what your phone can see. If your network is missing, tap **Refresh networks**. If it still does not appear, the signal at that spot is too weak, and it is worth moving the equipment or the router before going on.

5 · Configuring

The app sends the settings and the equipment restarts to join your network. The screen shows a **countdown of about five minutes** — the time the Aquarino KH needs to reboot and connect.

CAUTION

Keep the screen open and the phone nearby until the countdown ends. Leaving the app at this point interrupts the process, and you will have to run the wizard again from step 3.

6 · Done

The final screen confirms: _"Enjoy your new KH."_ Tap **Done**.

The Aquarino KH appears in your device list and starts reporting. From here on you can reach it from anywhere, without being on the same network.

7.3 If the connection is not confirmed

The wizard warns you when it cannot confirm that your phone is on the equipment's network. Work through this list:

Situation	What to do
The phone switched back to your home network on its own	Some phones change networks automatically when they detect the current one has "no internet". Turn that automatic switching off in Wi-Fi settings and connect again
The temporary network does not appear	Confirm the Wi-Fi LED is blinking. If the equipment has been configured before, unplug it, wait a few seconds and plug it back in
The network appears but will not connect	Move the phone closer to the equipment and try again
Setup finished, but the equipment is not in the list	The network password may have been mistyped, or the signal where the equipment sits is too weak. Repeat the process, checking the password

7.4 Requirements for your Wi-Fi network

Requirement	Detail
2.4 GHz only	The Aquarino KH does not connect to 5 GHz networks. If your router is dual-band, use the 2.4 GHz band — on many models it is enough to create a separate network name for it
Signal above 50%	Networks with weak signal are not listed. Weak signal is the most common cause of dropouts after installation
Name without special characters	Avoid spaces and accents in the network name. Rename it if necessary

Understanding signal strength

Band	Percentage	dBm	Situation
Excellent	80–100%	–30 to –50	Ideal for connection
Good	60–80%	–50 to –60	Stable connection
Fair	50–60%	–60 to –67	Acceptable, may fluctuate
Poor	below 50%	below –67	Connecting not recommended

TIP

If the equipment struggles to stay connected

Some routers get in the way of automation devices. On your router, it is worth trying:

- turning **Beamforming** off;
- turning **OFDMA / MU-MIMO** off;
- fixing the network to **802.11n** instead of mixed mode with 802.11b.

CHAPTER 8

Getting around the app

With the equipment added, the app opens on your **device list**. Tap the Aquarino KH to go into it.

Navigation sits at the **bottom** when you are on a phone and at the **top** on larger screens. There are six areas:

Area	What you find there
Home	The current state of the aquarium at a glance (Chapter 20)
Graphs	History, comparisons and export (Chapter 21)
Logs	A record of everything the equipment did (Chapter 22)
Custom.	Display preferences (Chapter 23)
Configuration	Calibration, target, doser, CO2 Port and integrations
System	Versions, network, maintenance and diagnostics (Chapter 24)

BACKGROUND

The equipment also answers on your local network

The Aquarino KH keeps an interface of its own, reachable at its IP address from any browser on your network — with the same screens as the app. It works **without internet**, which makes it useful if your connection drops. You will find the address on the System screen (Chapter 24).

You can also reach it by the equipment's **name**, without knowing the IP: type the name followed by **.local** in the browser. From the factory, the name is **AquarinoKH** plus the last six characters of the MAC address — for example, **http://AquarinoKH-2F06CA.local**. If you change the **Device Name** to **Reef**, the address becomes **http://Reef-2F06CA.local**. The MAC address appears on the System screen and on the equipment's label.

CHAPTER 9

Sharing access

A beautiful aquarium demands constant attention, and having to travel for a few days tends to cause worry. Through the app you can share access to your Aquarino KH with someone you trust, who can watch over it and act while you are away.

9 In the device list, find the Aquarino KH you own.

10 Open the **sharing** option for that equipment.

11 Enter the person's **e-mail** and confirm.

> **BACKGROUND**
> The person needs an account in the Aquarino app, created with the same e-mail you entered. You can revoke access at any time.

PART IV

Calibration

The step that determines the quality of every measurement that follows.

10 Full calibration

11 Partial calibration

12 The pH probe: calibration and health

13 What interferes with the measurement

CHAPTER 10

Full calibration

A full calibration empties every chamber of the Aquarino KH, draws a fresh sample and anchors the equipment to an alkalinity value that you measure with your chemical test.

Run a full calibration in these situations:

- at the **first installation** of the equipment;
- after **cleaning the chambers** internally;
- if the internal level has dropped because of repeated power cuts;
- if readings are inconsistent and you have already ruled out the causes in Chapter 13.

10.1 Before you start

IMPORTANT

Which water to fill with

Preferably use **fresh water** — mixed to the correct salinity and free of influence from other additives.

If you use **3-in-1 balling** products, do not fill the equipment with aquarium water. Prepare fresh water at the correct salinity and measure the KH of that water to enter at calibration.

CAUTION

Do not calibrate while the chemistry is moving

Do not calibrate during a **lanthanum** treatment, right after a large water change, or when introducing a new product. Calibrating in the middle of a change writes the deviation into the equipment. Chapter 13 details what interferes and at which levels.

10.2 Step by step

12 In the app, open **Configuration** and tap **Reservoirs**.

13 Tap **Empty**. Repeat until all internal reservoirs are completely empty and no more water comes out of the hose connected to your tank.

14 Check **visually** that the compartments are empty before going on.

15 Tap **Fill**. The equipment draws the water and calibrates the dosing pumps automatically. This takes about **10 minutes**.

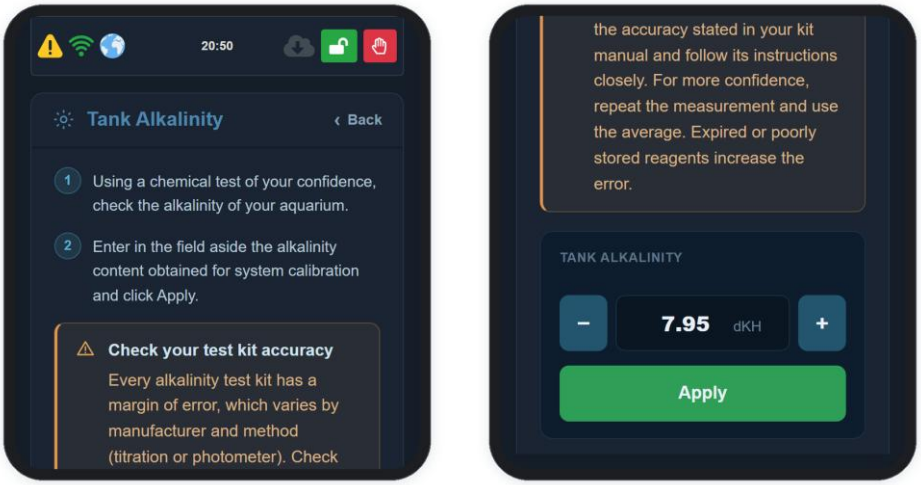
16 Using your chemical test, measure the KH of the aquarium water. Follow the kit manufacturer's instructions to the letter.

17 Go back to **Configuration** and open **Tank Alkalinity**.

18 Enter the measured value and tap **Apply**. The Aquarino KH starts the calibration automatically.



The Reservoirs screen: Empty, Fill and Stop.



The Tank Alkalinity screen, where you enter the value from your chemical test.

> **CAUTION**
> Whenever you run an empty or fill cycle, you must **enter the reference alkalinity again**. Without it the equipment has no anchor and the measurements are not reliable.

CHAPTER 11

Partial calibration

Partial calibration is the day-to-day adjustment: you measure KH with your chemical test and tell the equipment the value, without emptying anything. It takes less than a minute.

19 Measure your aquarium's KH with a chemical test you trust.

20 Open **Configuration → Tank Alkalinity**.

21 Enter the measured value and tap **Apply**.

BACKGROUND

How often to recalibrate

The equipment suggests a date for the next calibration and shows it on the home screen. You set the reminder interval in **Custom. → Calibration Reminder**, from weekly to yearly.

In practice: **weekly** for the first month, while you build confidence in the equipment, and **monthly** after that serves most systems very well.

CAUTION

Your chemical test's accuracy is part of the equation

Every alkalinity chemical test has a margin of error, which varies with the manufacturer and the method — titration or photometer. The **Tank Alkalinity** screen itself reminds you of this, under **Check your test kit accuracy**. Look up the accuracy stated in your kit's manual.

So do not recalibrate over every small difference between the test and the equipment. If the difference is of the order of your test's margin, it may be in the test, not in the Aquarino KH.

TIP

How to run a good reference test

Take the water from the same point where the equipment's hose tip sits;

Run the test at the same time of day the equipment measured, so you are comparing comparable values;

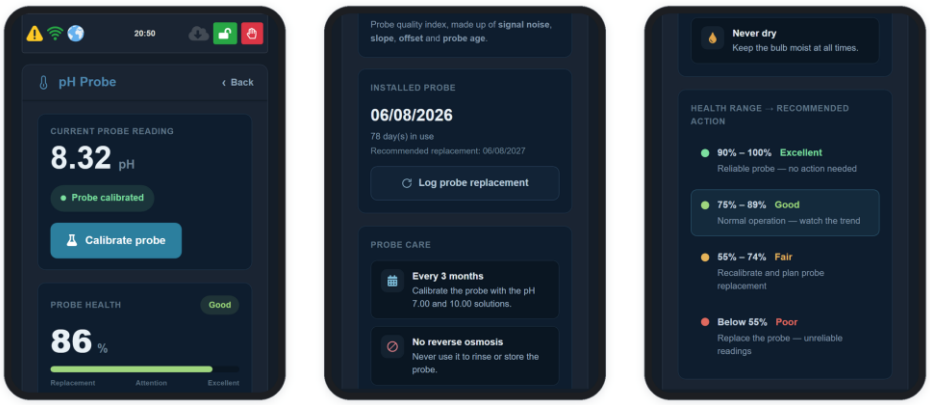
If you can, run the test twice and use the average;

Expired or badly stored reagent is the most common cause of "the equipment is wrong".

CHAPTER 12

The pH probe: calibration and health

This screen brings together everything about the probe: the current reading, the health index, the installation date, probe care and the calibration wizard. You reach it through **Configuration → pH Probe**.



The pH Probe screen: reading, the Calibrate probe button, health, installed probe and probe care.

12.1 Probe health

The health indicator is an index from 0 to 100% summarising probe quality from four factors: **signal noise**, **slope**, **offset** and **probe age**. It also appears on the home screen among the indicators.

Range	Rating	What to do
90–100%	**Excellent**	Reliable probe — no action needed
75–89%	**Good**	Normal operation — just watch the trend
55–74%	**Fair**	Recalibrate and plan probe replacement
below 55%	**Poor**	Replace the probe — unreliable readings

BACKGROUND

What slope means

Slope describes the probe's sensitivity: how much electrical signal it delivers per unit of pH. A new, healthy probe sits close to 59 mV per pH unit at 25 °C.

As the probe ages that value falls — through membrane contamination, glass wear or loss of internal electrolyte. It is one of the best early signals that replacement is approaching.

12.2 Logging a probe replacement

The screen shows the installation date, how many days the probe has been in use and the recommended replacement date. When you change the probe, tap **Log probe replacement** to reset that count.

> BACKGROUND
>
> **At 12 months: Replace now**
>
> When the probe reaches **12 months** of use with no replacement recorded, the recommended date gives way to **Replace now**, on the probe screen and on the home screen. Each time the equipment powers on, you receive a reminder e-mail: `pH probe in use for 12 months. Replace it now.` The warnings go away when you record the replacement.
>
> The screen changes on the day the 12 months are up, even if the equipment does not restart; the e-mail only goes out when it powers on. The count starts from the installation date, which is recorded when you record the probe replacement or, if you never recorded one, at the first calibration. Without that date there is no reminder, and the screen shows **Undefined**.

A new probe starts out **uncalibrated**: the screen shows **Probe not calibrated** and the warning **New calibration required**, and both clear on their own once you complete the wizard in section 12.3.

> IMPORTANT
>
> Logging the replacement is not paperwork: age is part of the probe health calculation. If you replace the probe and do not log it, the indicator will keep penalising a probe that no longer exists.

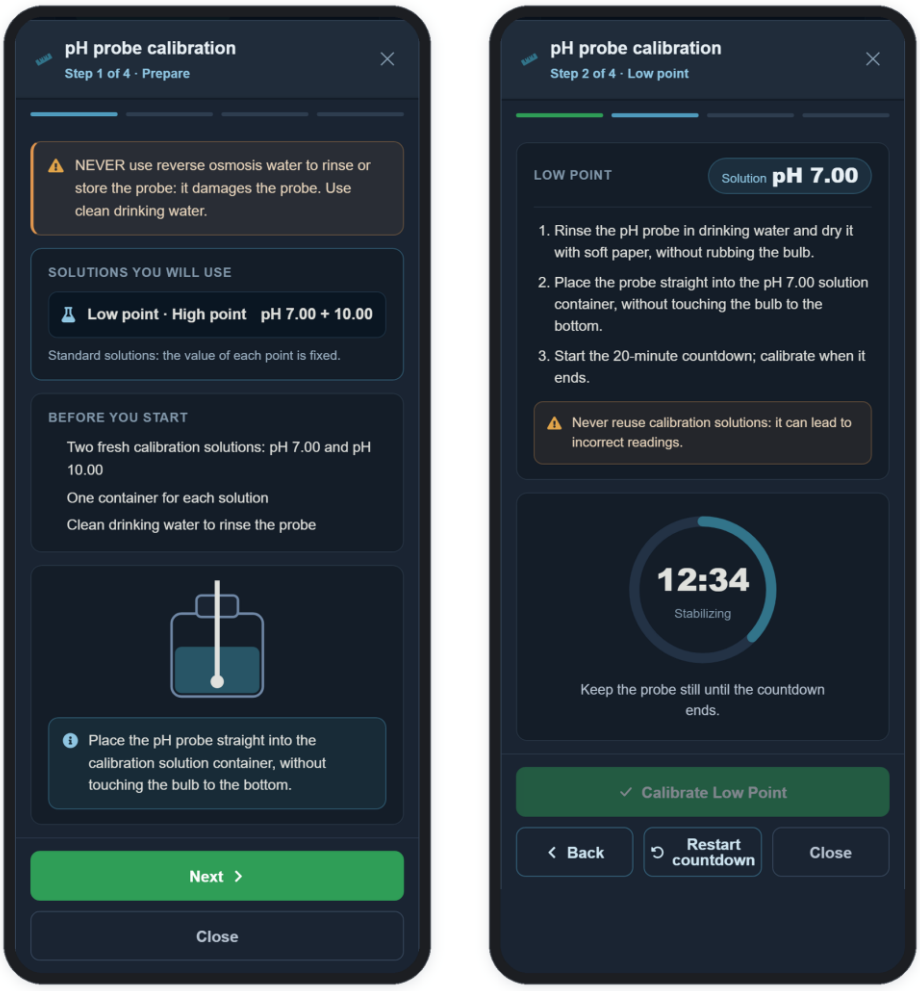
12.3 Two-point calibration

Probe calibration is what lets the equipment display the **real pH of your aquarium**. It is not required in order to measure KH — see section 2.4.

Tap **Calibrate probe**. A wizard opens and takes you through **four steps**, always in the same order. Set aside about **50 minutes**: each point needs 20 minutes to stabilise.

Step	What happens
1 · Prepare	The wizard reminds you what to have ready and the main thing to watch with the probe
2 · Low point	The probe in the **pH 7.00** solution, 20 minutes of stabilisation and the first point saved
3 · High point	The same with the **pH 10.00** solution

Step	What happens
4 · Done	Confirmation that the probe is calibrated, and its **slope**



Step 1, Prepare, and step 2, Low point, during the countdown: the ring on Stabilizing and the calibrate button still greyed out.

Step 1 · Prepare

Before you start, have ready:

- Two **fresh** calibration solutions: pH 7.00 and pH 10.00 — the ones supplied with the product.
- One container for each solution.
- Clean **drinking water** to rinse the probe.

The point values are fixed: the wizard always uses pH 7.00 for the low point and pH 10.00 for the high point. Tap **Next**.

> CAUTION
>
> **Reverse-osmosis water is not for rinsing the probe**
>
> It is the most common mistake in calibration — and precisely because it looks like the careful thing to do. The RO water in your aquarium is the cleanest water you have at home, and that is exactly why it attacks the probe: with no dissolved salts, it dissolves whatever it finds, starting with the glass bulb and the reference electrolyte. The result is a slow, unstable reading and a probe that lasts less.
>
> Use **drinking water** between one point and the next. Deionised water will not do either.

Steps 2 and 3 · Low point and high point

Both points follow the same routine; only the solution changes:

22 Rinse the probe in **drinking water** and dry it with soft paper, **without rubbing the bulb**.

23 Place the probe straight into the solution container — pH 7.00 for the low point, pH 10.00 for the high point — **without touching the bulb to the bottom**.

24 Tap **Probe in place — start stabilization**. A **20-minute** countdown starts on a ring that fills up as it goes: **Stabilizing**, and at the end **Stable**.

25 Keep the probe **still** until the countdown ends — that is what the line under the ring reminds you while it runs: **Keep the probe still until the countdown ends.** When the countdown finishes, the line changes to **Reading stable — you can calibrate the point.**

26 When **Stable reading** appears, tap **Calibrate Low Point** — or **Calibrate High Point**. The wizard moves on to the next step by itself.

On screen	What it means
Calibrate button greyed out	The countdown has not finished yet. It is only enabled after the 20 minutes — there is no skipping it
Restart countdown	Shown during the countdown. Use it if the probe moved or was disturbed: the countdown goes back to 20 minutes
Sent to the device	After the low point: the command reached the equipment
Saved and confirmed by the device	After the high point: the equipment confirmed that the probe is calibrated

IMPORTANT

Never reuse calibration solutions

A solution that has already been used has been contaminated by the probe and by the air, and its pH has changed. Calibrating with it saves a wrong point. Discard the solutions after each calibration.

BACKGROUND

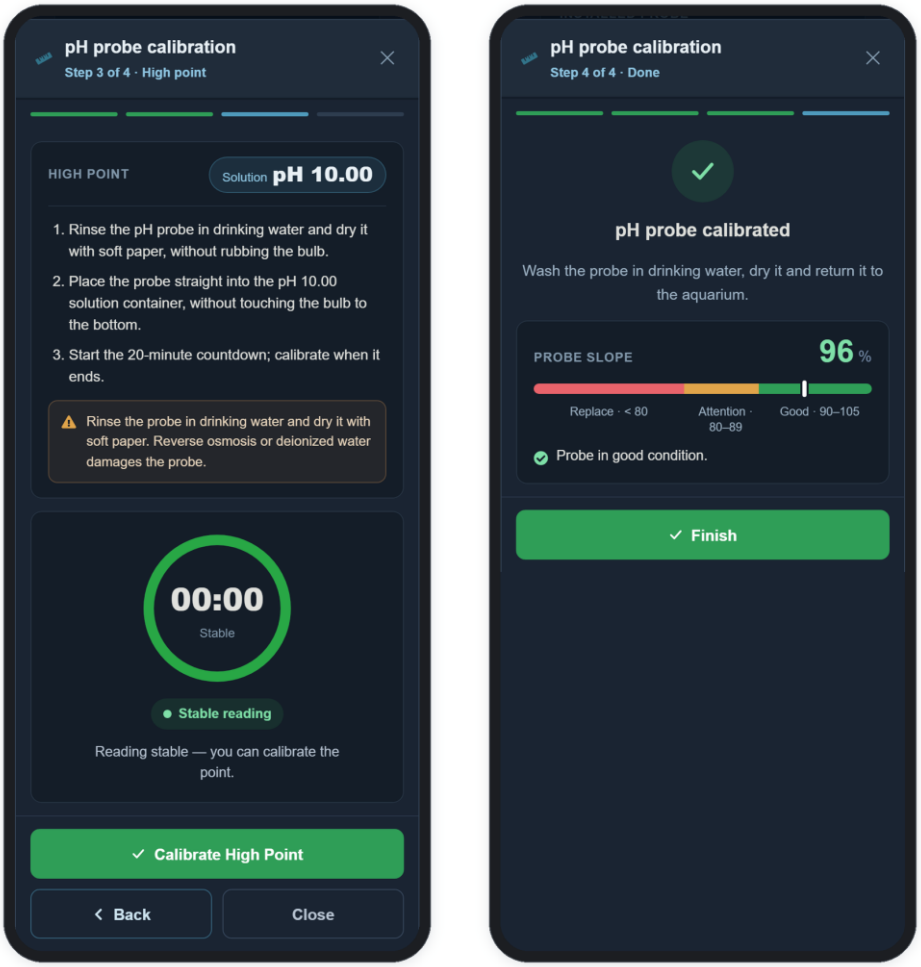
If you close the wizard halfway

Closing the window — with the **X**, with **Close** or by tapping outside it — **stops the countdown**. When you open it again, the wizard starts over from the Prepare step. The **Back** button returns to the previous step and also resets the countdown.

TIP

Why 20 minutes

A probe that has just been immersed is still drifting towards the new value. Calibrating too early writes a wrong point and makes the reading worse, not better. The 20 minutes guarantee a stable reading — and the wizard only enables the button after them.



Step 3, High point, with the countdown over: Stable reading and the button enabled. Beside it, step 4, Done, with the probe slope.

Step 4 · Done

The wizard shows **pH probe calibrated**. Wash the probe in drinking water, dry it and return it to the aquarium. The same screen shows the probe's **slope** — a score of its sensitivity, as a percentage of the ideal:

Slope	Range	What to do
90 to 105	**Good**	Probe in good condition
80 to 89	**Attention**	Probe ageing — plan the replacement
below 80	**Replace**	Low slope — replace the probe

Tap **Finish** to close the wizard. The screen then shows **Probe calibrated**.

BACKGROUND

What slope means

Slope describes the probe's sensitivity: how much electrical signal it delivers per unit of pH. A new, healthy probe sits close to 59 mV per pH unit at 25 °C — that is the **100%** on the gauge.

As the probe ages that value falls — through membrane contamination, glass wear or loss of internal electrolyte. It is one of the best early signals that replacement is approaching.

12.4 Probe care

The **Probe care** panel, on the same screen, sums up the three rules that do the most to extend the probe's life:

Care	Why
Every 3 months, calibrate with the pH 7.00 and 10.00 solutions	The probe drifts over time; recalibrating keeps the displayed pH reliable
No reverse osmosis: never use it to rinse or store the probe	Water without salts attacks the bulb and the internal electrolyte
Never dry: keep the bulb moist at all times	A bulb that dries out loses sensitivity and may not recover

CHAPTER 13

What interferes with the measurement

If readings are fluctuating more than you expect, work through this chapter before recalibrating. The causes fall into two groups: **mechanical**, tied to the equipment and the sample, and **chemical**, tied to your aquarium water. In the vast majority of support cases the cause is in the first group.

13.1 Mechanical causes

Cause	How to identify and resolve it
Unequal aeration between the chambers	The most frequent one. Check the side valves: both chambers need strong, equivalent airflow, with at least 5 mm of foam. If the air pump is weak, clean the air system or replace the pump.
Dirt and biofilm in the chambers	Empty, open the lid, clean, then refill and recalibrate. There is a video of the procedure at https://youtube.com/shorts/qm--dZ7LNUg
Worn pH probe	Check Probe Health (Chapter 12). Below 55%, or more than 12 months in use, replace it.
Stray voltage in the water	Current leaking from some electrical device in the aquarium interferes with the probe reading. Test by switching devices off one at a time.
Unrepresentative sample	Move the hose tip: away from detritus, from the skimmer and from the balling dosing point.
Sharp temperature swings	Move the equipment away from the chiller or any heat source.

13.2 Your aquarium chemistry

This group of causes is less common, but it is usually the most confusing when it shows up — because the equipment is still working perfectly and yet disagrees with your chemical test. It is worth understanding why.

BACKGROUND

Alkalinity is not a substance — it is a sum

Alkalinity does not correspond to a single compound dissolved in the water. It is the **sum of everything present that can neutralise acid**.

In healthy marine water, most of that sum is carbonates and bicarbonates — exactly what you want to track and replace. The rest comes in as a small, reasonably constant fraction: borate mainly, and in far smaller amounts phosphate, silicate and organic compounds.

Your **chemical test** measures that entire sum: it counts everything together, without separating what is carbonate from what is not. So when the water departs from the usual pattern and the fraction that is **not** carbonate grows, the test number rises without your carbonate reserve having changed.

The table below gathers what is worth investigating when the test and the equipment disagree, with the normal range for a reef aquarium and the order of magnitude of the deviation — in dKH, so you can compare it with the difference you are seeing:

Parameter	Normal range	Investigate from	How much it weighs
Boron / borate	4.0 to 5.0 mg/L	above 6 mg/L	It is the second largest buffer in marine water, behind only carbonates, and the most common deviation in practice. In **your test**, about **+0.09 dKH** at 6 mg/L and **+0.34 dKH** at 10 mg/L — without your carbonate reserve having changed
Salinity	34 to 36 ppt (1.025–1.027)	outside 33–37 ppt	About **0.06 dKH** for each ppt of deviation. The chemistry of the whole of marine water depends on salinity, so it is worth checking the refractometer before suspecting anything else
Dissolved organic matter	clear water, active skimmer	yellowing water, skimmer stopped or undersized	Chemically, little — on the order of **0.1 dKH**. The real weight is mechanical: organic matter fouls the chambers and the probe, and then the problem stops being chemical (section 13.1)
Temperature	24 to 27 °C, stable	swings above 2 °C during the cycle	Chemically it is small, around **0.01 dKH per °C**. What gets in the way is the variation **during** the cycle, which keeps the reading from settling — hence the recommendation to keep the equipment away from the chiller
Worn pH probe	Probe Health above 75%	below 55%, or more than 12 months in use	A drift of just **0.01 in the pH reading** is worth about **0.2 dKH**. It is the single cause that shifts the result the most — and the easiest to fix (Chapter 12)

BACKGROUND

What the forums blame and does not move your reading

Three frequent suspects have too small an effect to explain a divergence you can actually see:

• **Phosphate** — even at 1.0 ppm, ten times the normal reef value, it weighs less than **0.05 dKH**;

• **Silicate** — at 3 ppm, it weighs less than **0.01 dKH**; you would have to go past 40 ppm to reach 0.1 dKH;

• **Ammonia** — a detectable trace weighs less than **0.01 dKH**. It is an excellent sign that the system is not stable, but it is not what is shifting your measurement.

If the difference you are seeing is larger than that, the cause lies elsewhere — start with section 13.1.

CAUTION

Lanthanum

Using **lanthanum** directly affects calibration and measurements for a period of **6 to 12 hours**. If you treat the aquarium with lanthanum-based products, suspend measurements during the treatment and resume after that interval.

It is worth knowing that here the alkalinity **really does drop**: lanthanum precipitates together with the carbonate in the water, and it also leaves a floc in suspension that fouls the chambers and coats the probe. It is not the measurement that is wrong — it is the aquarium that changed, and the reading only makes sense again once the floc settles and the system stabilises.

TIP

Where excess borate comes from

Most cases originate in three places:

• **synthetic salt** — some brands deliver boron above the level of natural seawater;

• **borate-based KH products** — sold as "buffer", they raise measured alkalinity without delivering the same amount of carbonate;

• **_all-in-one_ solutions** — depending on the formulation, they add borate with every dose.

If you suspect this, a boron test settles the question. A partial water change with a lower-boron salt is the usual way to correct it.

IMPORTANT

Odd chemistry matters less than changing chemistry

Water that is off the usual pattern but **stable** is largely absorbed when you calibrate: the equipment ends up anchored to that water.

What really destabilises the reading is chemistry **in motion** — a treatment under way, a large water change, a new product's debut, a spike in organic matter. At those moments, wait for the system to settle before recalibrating. Recalibrating mid-change writes the deviation into the equipment.

13.3 Real fluctuation or reading noise?

TIP

Open **Graphs** and look at the last 24 hours. If the points rise and fall with no pattern, from one measurement to the next, that is noise — look for the cause in 13.1.

If there is a shape that repeats every day, following the photoperiod, that is not noise: it is your aquarium's real consumption showing up. In that case the equipment is doing exactly what it should.

BACKGROUND

The automatic re-test

When a measurement diverges sharply from the previous one, the equipment does not accept the value straight away: it triggers a new measurement to confirm. You see this in the event log as a re-test warning. It is a safeguard against correction decisions based on a bad reading.

PART V

Putting it to work

Set the target, choose how it corrects, and let the equipment handle the rest.

14 Target alkalinity, frequency and alerts

15 Monitoring mode

16 Alkalinity Doser

17 Calcium reactor through the CO2 Port

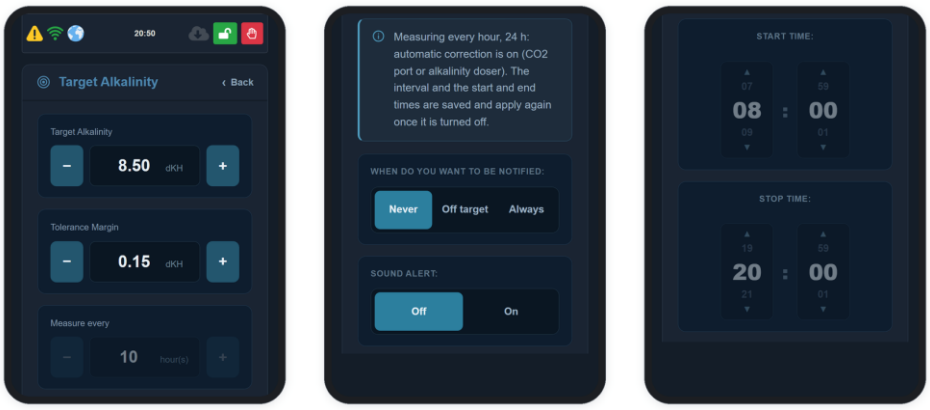
18 Integrating with other equipment

19 The first seven days

CHAPTER 14

Target alkalinity, frequency and alerts

This is the screen that governs almost everything: the value you consider ideal, how much variation you tolerate, how often to measure and how you want to be told. You reach it through **Configuration → Target Alkalinity**.



The Target Alkalinity screen holds target, margin, frequency, notification and time window. With the Alkalinity Doser or CO2 Port control on, it warns that the equipment is measuring every hour, 24 hours a day.

14.1 Target alkalinity

This is the KH you want to hold. For reef aquariums the usual range is **7 to 9 dKH**.

> TIP
>
> **Which value to choose**
>
> More important than the number itself is **holding** the number. An aquarium stable at 7.5 dKH does better than one swinging between 7 and 9 in search of the "ideal".
>
> If your aquarium is already stable somewhere in the range, use that value as your target. If you want to change it, change slowly — no more than 0.5 dKH per week.

14.2 Tolerance Margin

The margin sets the band around the target within which the equipment considers everything fine. It runs from **0.15 to 1.00 dKH**.

> EXAMPLE
>
> With a target of **9.00 dKH** and a margin of **0.30 dKH**, the band treated as normal is **8.70 to 9.30 dKH**. Outside it the equipment raises alerts and, if correction is on, starts acting.

BACKGROUND

The margin also protects the measurement

When a reading differs from the previous one by more than **twice the margin**, the equipment distrusts it, discards it and measures again straight away — this is the **re-test**, and it is automatic. With a margin of 0.15 dKH, a difference above 0.30 dKH already triggers the new measurement.

Too tight a margin produces needless alerts and re-tests; too wide a one lets the aquarium drift without you noticing. The default of 0.15 dKH works well for most systems.

14.3 Measurement frequency

The **Measure every** field sets the interval in hours, from 1 to 24. Since measuring consumes no reagent, there is no cost in measuring often.

Interval	When it makes sense
1 hour	Aquariums with a calcium reactor, unstable systems and the first days of use. With the CO2 Port or the Alkalinity Doser on, the equipment already measures every hour on its own
2 to 4 hours	General use. Good resolution to follow the daily cycle without crowding the graph
6 to 12 hours	Very stable systems, where you only want to watch the trend

CAUTION

If you turn on reactor control through the **CO2 Port** or the **Alkalinity Doser**, in Normal or Fast mode, the equipment switches to measuring **every hour, 24 hours a day**, and the interval and window set here are ignored while that control is on. Your values stay stored and apply again as soon as you turn it off.

Meanwhile, the screen itself tells you that it is measuring every hour, and the **Measure every**, **Start time** and **Stop time** fields are locked, showing your stored values.

The doser needs to see KH every hour to correct safely: it doses right after each measurement, and only then (Chapter 16).

14.4 Time window

Start time and **Stop time** limit measurements to a period of the day. Leaving both at `00:00` means the equipment measures around the clock.

TIP

The window is useful if you want quiet at night, since the aeration cycle makes some noise. But bear in mind: KH usually varies most at night, when there is no photosynthesis. If you can, leave it measuring 24 hours — the night data is the most informative.

With the Alkalinity Doser or CO2 Port control on, the window does not apply: the equipment measures 24 hours a day, and the time window you chose applies again when you turn the control off (section 14.3).

14.5 Notifications

The field **When do you want to be notified** sets when the equipment sends e-mail:

Option	Behaviour
Never	No measurement e-mails. You still see everything in the app
Off target	E-mail only when KH leaves the band set by target and margin
Always	E-mail on every completed measurement

TIP

Start on **Always** for the first days, to build confidence in the equipment and learn your aquarium's rhythm. Then switch to **Off target** — that is the setting most users keep long term.

Two alerts arrive regardless of this choice: an automation failure and a low bottle level on the Alkalinity Doser.

EXAMPLE

The measurement e-mail

The e-mail is short. The subject says whether KH is low, on target or high — **KH LOW.**, **KH OPTIMAL.** or **KH HIGH.** —, and the body gives the value and time of the measurement and, when there was one, that hour's correction:

```
Measured: 7.69 dKH at 2026/11/30 00:05.
Corrections: Alkalinity doser: 1.04 ml (+0.010 dKH)
```

With CO2 Port control on, the **Corrections** line also shows the port percentage — for example, `CO2 Port 35%` —, and the items are separated by **&**. It may also carry two doser warnings: `Alkalinity doser reservoir is low. Refill needed.`, when the bottle does not cover the dose, and `Daily dosing limit reached.`, when the doser has reached its daily dosing limit (Chapter 16).

This e-mail follows the choice in the table above: on **Always**, every measurement; on **Off target**, only when KH leaves the band. With **Notification on Dosing** turned on, on the doser screen, it also comes on every measurement in which the doser dosed.

14.6 Sound Alert

Turns the audible warning on or off when KH is outside the band. The panel colour LED keeps working either way.

CHAPTER 15

Monitoring mode

This is the simplest mode: the Aquarino KH measures and warns, but does not act. All correction stays in your hands.

You do not need to configure anything to use it — just leave the Alkalinity Doser on **None** (Off) and the CO2 Port on **Disabled**.

If KH is	What the equipment does
Above the band	E-mail with the result, sound alert and **red** LED
Inside the band	E-mail with the result (if configured) and **green** LED
Below the band	E-mail with the result, sound alert and **blue** LED

15.1 Who this mode is for

For anyone who already has a working replenishment system — balling with several pumps, or a well-tuned calcium reactor — and wants, above all, to **see** what is happening.

With the history at hand you can answer questions that used to be guesswork:

- Is my daily alkalinity consumption really what I think it is?
- Does the drop happen during the day or at night?
- Did that water change move KH? By how much?
- After I increased the dose, did the aquarium actually settle?

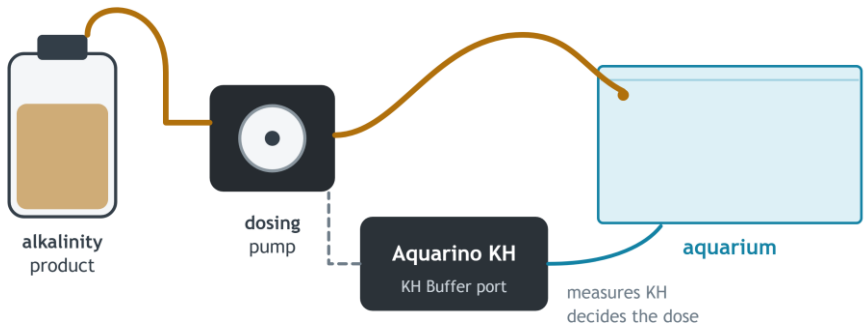
> TIP
>
> **Adjusting dosage with data**
>
> If you dose balling manually or through independent pumps, concentrate the doses in the **photoperiod**. Alkalinity consumption is higher with the lights on, and dosing in step with that rhythm reduces the swing of KH across the day — which is exactly what the graph will show you.

CHAPTER 16

Alkalinity Doser

Corals consume alkalinity — KH — all the time: more during the day, with the lights on, and less at night. The **Alkalinity Doser** gives back to the aquarium what was consumed and keeps KH close to the target you chose, **without letting the value rise or fall suddenly**.

It is an external dosing pump connected to the panel's **KH Buffer** port, set up in **Configuration → Alkalinity Doser**. It works with any alkalinity product — 3-in-1 balling, All-For-Reef, alkalinity-only buffer — and the equipment does not ask which: it sees the result in its own measurement.

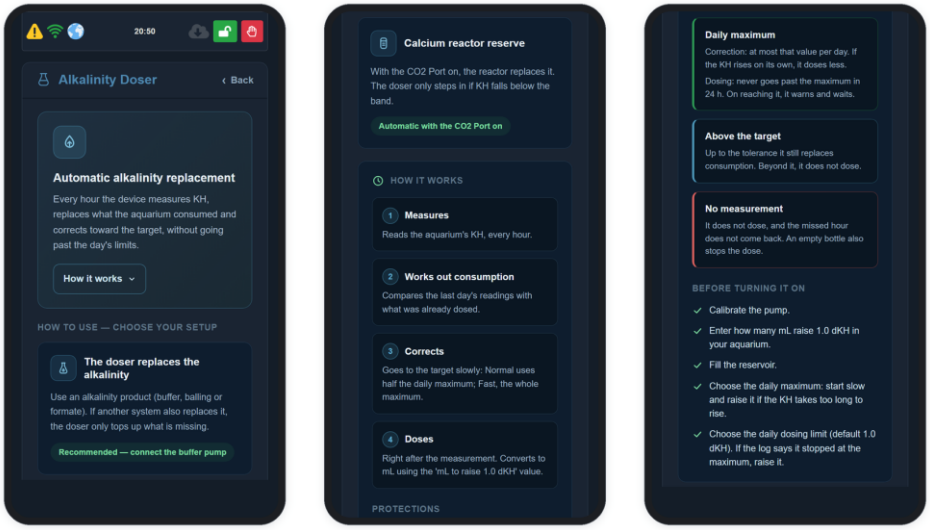


The product's path: the bottle, the dosing pump connected to the KH Buffer port, and the aquarium. The Aquarino KH measures the aquarium water and decides how much the pump doses.

When you open the screen, the top shows a **guide** to the doser itself: **Automatic alkalinity replacement**, with a summary of the cycle and the **How it works** button, which shows or hides the rest. It starts open and sums up, in a few lines, what this chapter explains in detail:

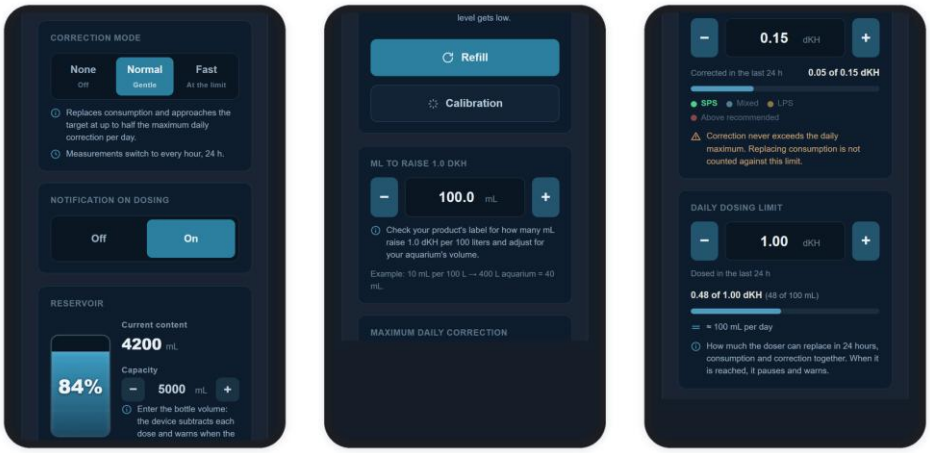
Part of the guide	What it shows	Where it is in the manual
HOW TO USE — CHOOSE YOUR SETUP	The doser replacing the alkalinity, or as the calcium reactor reserve	Section 16.4
HOW IT WORKS	Measures every hour, works out consumption, corrects and doses right after each measurement	Sections 16.1 and 16.2
PROTECTIONS	Daily maximum, above the target and no measurement	Sections 16.3 and 16.9

Part of the guide	What it shows	Where it is in the manual
BEFORE TURNING IT ON	Calibrate the pump, enter the mL to raise 1 dKH, fill the reservoir, choose the daily maximum and set the daily dosing limit	Sections 16.3 and 16.5 to 16.7



The top of the Alkalinity Doser screen: the guide with the usage setups, the four steps of how it works, the protections and what to do before turning it on.

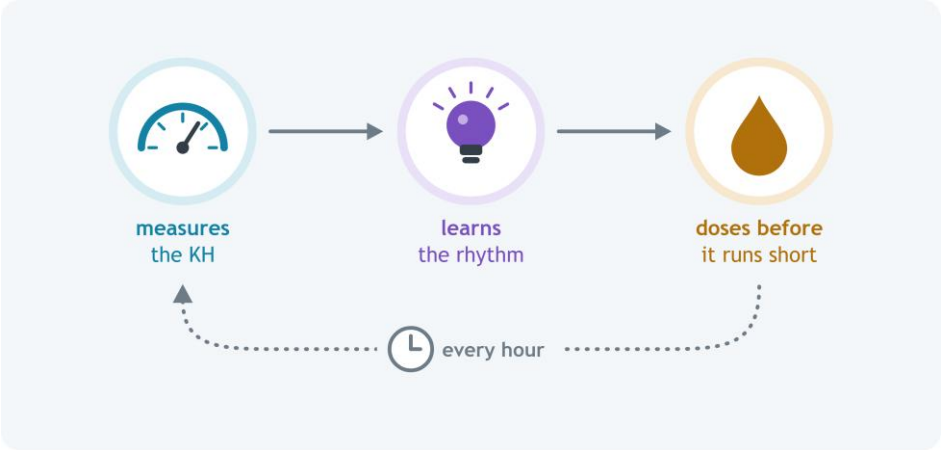
Right below the guide are the controls:



The controls of the Alkalinity Doser screen: correction mode, notification, reservoir, mL to raise 1 dKH, maximum daily correction and daily dosing limit, with what has already been corrected and dosed in the last 24 hours.

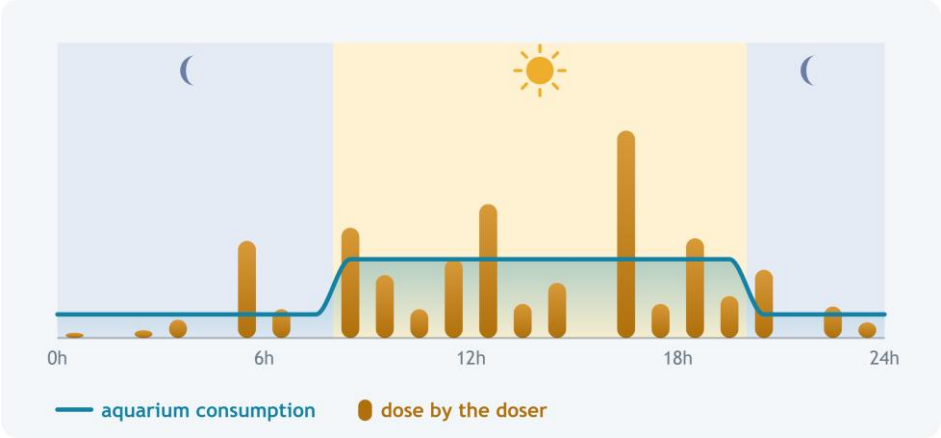
16.1 How it works

With the doser on, in Normal or Fast mode, the device measures KH **every hour, 24 hours a day**, and doses **right after each measurement**. The interval and the time window you chose on the **Target Alkalinity** screen stay stored and apply again when you turn the doser off (sections 14.3 and 14.4).



Every hour, the same cycle: measure KH, learn from what happened since the previous measurement, and dose what the aquarium will need until the next one.

With every measurement it **learns a little more about your aquarium**: how much it consumes at each hour of the day — more with the lights on, when corals calcify, and less at night. That lets the doser **stay one step ahead**: it doses what the aquarium will consume until the next measurement, instead of chasing what is already missing. The result is a stable KH, with no sudden rises or drops.



A day with KH on target: the doser follows the aquarium's rhythm, with larger doses by day and smaller ones at night.

EXAMPLE

One hour of work

The **8:00** measurement reads **7.90**, with the target at **8.00**. The doser doses what the aquarium usually consumes until 9:00, plus a little extra to move closer to the target.

At **9:00** it measures again, compares what it expected with what actually happened, and adjusts the next dose. In about two days KH gets close to the target and from then on varies little across the day, usually a little above the target, within your margin.

It also checks, measurement by measurement, **how much each dose really raises KH**, and makes up for small differences between the yield you entered and the real one. A value that is far off is not something it can fix: entering the right yield still matters (section 16.7).

What it does in each situation

The doser looks at where KH stands in relation to the target and to the **tolerance margin** you chose on the Target Alkalinity screen:



What the doser does in each KH band, with the target at 8.00 and the tolerance margin at 0.15.

- **KH dropped over the last few hours** — during a consumption peak in the late afternoon, for example: it gives that drop back right away, without waiting.
- **Reading above the target plus half the margin** — with the target at 8.00 and the margin at 0.15, from 8.08: it does not dose that hour, and the next measurement decides again.

Hour without a measurement, hour without a dose

If a measurement does not happen — a failure, the device switched off —, **that hour goes without a dose**, and nothing is made up all at once later. The next measurement picks up from the current reading.

16.2 Correction mode

The mode turns the doser on and sets how **gently** it corrects towards the target. Both modes replace consumption the same way.

Mode	On screen	What it does
None	Off	Does not dose
Normal	Gentle	Corrects towards the target by up to **half the maximum daily correction** per day

Mode	On screen	What it does
Fast	At the limit	Corrects towards the target by up to the **whole maximum daily correction** per day

BACKGROUND

Below and above the target

With KH **below the target**, both modes rise at practically the same speed: what holds the rise back is the **daily dosing limit** (section 16.3). A drop over the last few hours is given back in the very next measurements.

With KH **above the target**, the mode sets how much the dose is reduced: in Normal, KH comes down more slowly. Once KH is more than half the margin above the target, the doser does not dose.

TIP

Start in Normal and keep the **daily dosing limit** close to your aquarium's consumption (section 16.3): it is the gentlest combination for corals.

16.3 The limits of each day

The doser has two daily limits, which you set on the screen. They do different things:

Field	What it limits
Maximum daily correction	Only the **approach to the target**: how much KH may change in one day to get there. Replacing consumption, including a drop over the last few hours, is left out of this count
Daily dosing limit	**Everything** the pump delivers in 24 hours, consumption replacement and correction added together. It is the safety ceiling and, with KH below the target, what holds back the speed of the rise

Maximum daily correction

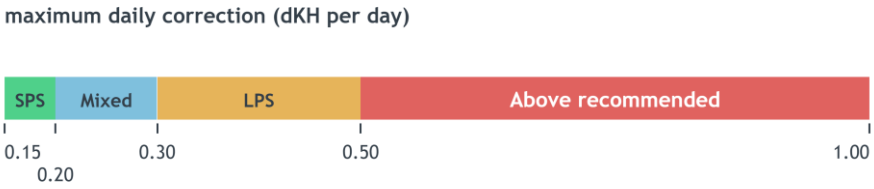
This is how much KH may change **in one day** in the correction towards the target, not counting consumption replacement. It goes from **0.15 to 1.00 dKH per day**, and the factory default is **0.15**, the most cautious value. Below the field, **Corrected in the last 24 h** shows how much of the correction has already been used.

BACKGROUND

Replenishment does not count towards it

Even if your aquarium consumes 3 dKH per day, the doser replaces all 3 — and giving back a drop over the last few hours is replacement too. What limits the total is the **daily dosing limit**, just below: it needs to be above consumption.

Below the value, the screen shows a **guide by coral type**. It does not lock anything: you choose any value in the range, and the screen shows which type of corals it suits.



The guide by coral type that the screen shows below the maximum daily correction.

Coral type	Daily maximum	For whom
SPS	up to 0.20 dKH	Mostly small-polyp stony corals
Mixed	up to 0.30 dKH	Aquariums with SPS, LPS and soft corals together — a good starting point for most
LPS	up to 0.50 dKH	Mostly large-polyp stony corals and soft corals
Above recommended	above 0.50	Above the guidance, for when you are watching the aquarium closely

BACKGROUND

In your unit

The field follows the unit you chose. In dKH, it goes from 0.15 to 1.00, in steps of 0.01. In ppm $CaCO_3$, from 3 to 18, in steps of 1. In mEq/L, from 0.054 to 0.357, in steps of 0.001.

The field only appears with the doser on, in Normal or Fast mode.

Daily dosing limit

This is the **total** the doser may deliver in any 24 hours, consumption replacement and correction added together. It is your aquarium's most important protection: if the device **stops seeing KH change** — a faulty probe, a wrong calibration, a wrong value in **mL to raise 1.0 dKH** —, the doser may think it needs to dose a lot, and the daily dosing limit does not let it, **even with the wrong reading**.

The default is **1.0 dKH per day**, and the field accepts **0.1 to 10.0**. Below the value, the screen shows how much it represents in millilitres per day and, under **Dosed in the last 24 h**, how much has already left the pump. This count, like **Corrected in the last 24 h**, adds up the measurements of the last 24 hours, not of the calendar day.

TIP

How much to set

Set it **close to your aquarium's daily consumption, never below it**: with the maximum below consumption, the doser cannot replace what the aquarium uses. If it consumes 2.0 dKH per day, the default of 1.0 will not do — set something like 2.5.

It also sets the **speed of the rise** when KH is below the target: the rise per day is close to the maximum minus consumption. With the factory maximum of 1.0 and a consumption of 0.5, KH rises by up to about 0.5 per day. For stony corals, a maximum about 0.2 above consumption keeps the rise at around 0.2 per day. This assumes the right **mL to raise 1.0 dKH** value (section 16.7): if the product is stronger than the value entered, the rise is larger.

If the limit is reached, **check consumption and the probe before raising it**: the aquarium may be consuming more, another replenishment may have failed, or the reading may not be following the alkalinity reserve.

To get an idea of consumption: with KH stable on target and the doser as the only replenishment, take one day's volume of the **Buffer (mL)** parameter in Graphs and divide it by the **mL to raise 1.0 dKH** value. Example: 50 mL in a day, with 100 mL to raise 1 dKH, is 0.5 dKH per day. If you use another replenishment, your test kit also gives you this number: measure KH at the same time on two days in a row, without replenishing anything between the measurements.

When the total of the last 24 hours reaches the maximum, the doser **pauses** until the oldest doses leave the 24-hour window, and the device keeps measuring. You find out in three ways: a line in the event log, an e-mail — even with notifications turned off — and the message **Daily dosing limit reached. Consumption rose or another replacement failed.** on the screen. When the window frees up, the doser resumes on its own.

EXAMPLE

A reading that does not follow the aquarium

The reading stays **1.0 below the real value** for two days, with the real KH on target. Without the daily dosing limit, the doser would raise the dose hour after hour, trying to lift a KH that has already risen.

With the factory daily dosing limit of **1.0 dKH per day**, it reaches the maximum within a few hours and, from then on, doses only what the limit allows. The real KH rises slowly, which gives you time to notice it on the graph or in the maximum-reached e-mail. When the reading returns to normal, the doser pauses and consumption itself brings KH back.

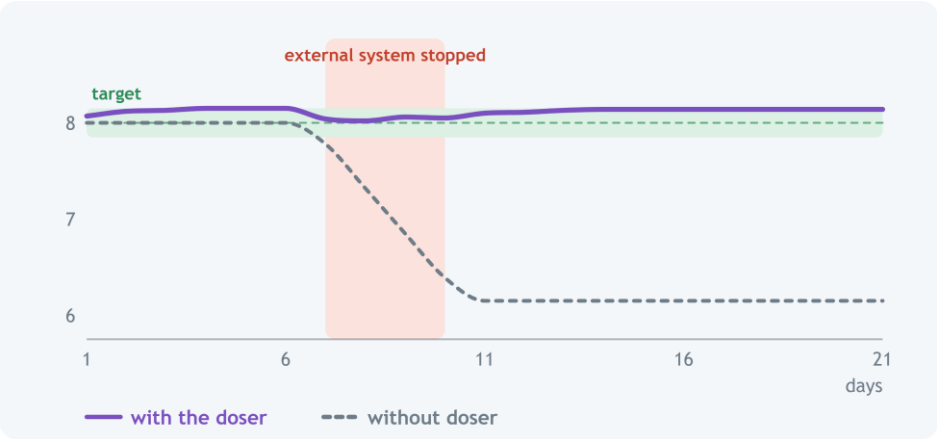


A wrong reading for two days: the daily dosing limit holds the dose back, and KH returns to target when the reading returns to normal.

16.4 If you have another replenishment system

There is no need to tell the device anything: **it notices on its own**.

Your system	What the doser does
Calcium reactor with CO2 Port control on (Chapter 17)	The port takes care of KH. The doser stays **in reserve** and only steps in after **three measurements in a row** with KH below the band — for example, because the CO2 ran out. When the port copes again, the doser stops on its own
External dosing pumps, a reactor without port control, or kalkwasser	The doser **only tops up what is missing**. If your system covers everything, it hardly doses at all. If it covers half, the doser makes up the other half



The external system stops for three days: without the doser, KH plunges; with it, the aquarium barely notices, and the doser goes back to standing idle when the external system returns.

BACKGROUND

The doser does not remove alkalinity

It only adds. If, with your replenishment system back, KH ends up above target, what brings the value back down is adjusting your system — lower its dosage or the reactor's CO2.

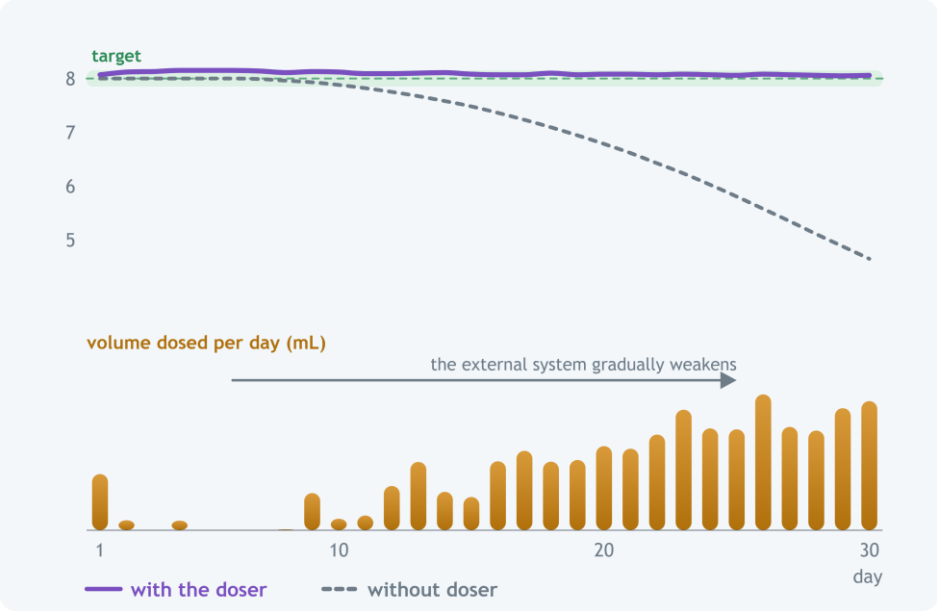
At first, with another system already replacing everything, the doser **may dose a little** until it understands your aquarium; after that it stays practically idle. Since it can only add, KH may end up **a little above target**, within your tolerance margin — that is normal.

TIP

Quiet protection, with the history in view

If your replenishment system gradually loses strength — the reactor's CO2 running out, the other dosing pump losing flow —, the doser makes up the difference automatically. KH stays on target and your corals do not even notice.

And you can keep an eye on it too: in Graphs, the **Buffer (mL)** parameter shows how much it is dosing. If the volume keeps growing week after week, it is a good moment to take a look at your main system — calmly, because the aquarium is protected.



The external system weakens little by little: the doser makes up the difference and KH stays on target. The clue is in the volume dosed per day, which keeps growing.

16.5 What you need to set up

27 **Calibrate the pump**, so the device knows how much product comes out (section 16.6).

28 **Enter the mL to raise 1 dKH** for your product in your aquarium (section 16.7). The field comes from the factory set to 1 mL, which suits no product: without the right value, the doser does not dose properly.

29 **Enter the bottle size**, in **Capacity**, to keep track of how much is left.

16.6 Calibrating the pump

Calibrating the pump is what makes an order to "dose 25 mL" actually deliver 25 mL. Doser tubing loses flow with use, so it is worth repeating this from time to time.

On the **Alkalinity Doser** screen, in the **Reservoir** block, tap **Calibration**: the panel opens right there, with three steps:

Step 1 · Fill the tubing

Click **Purge** and let the pump run until the tubing is completely full of buffer, with no bubbles. Click **Stop** when done.

> CAUTION
> This step is not optional. With air in the tubing, the following steps measure the wrong volume, and that error gets written into the calibration.

Step 2 · Measure what the pump delivers

30 Put the end of the tubing into a graduated container — a cylinder, syringe or measuring cup.

31 Click **Start Calibration**. The pump will run for **60 seconds**.

32 Measure the volume delivered and enter it in **Volume Measured**, in millilitres.

Step 3 · Check

Adjust the **Dosing rate** and click **Test**. The equipment should deliver **5 mL of buffer**.

If it delivered	What to do
More than 5 mL	Lower the dosing rate and test again
Less than 5 mL	Raise the dosing rate and test again
5 mL	Done. The pump is calibrated

> **TIP**
> Use a container with decent resolution. A 1 mL error over 5 mL is a 20% error on every dose the equipment will ever make.

16.7 Telling it what your product yields

With the pump calibrated, the equipment still needs to know **what your product yields**. The **mL to raise 1.0 dKH** field is what turns "dose 0.25 dKH" into millilitres: it wants the volume, in mL, that raises **your whole system** by 1 dKH.

To work it out you need two numbers — the product's yield and the real water volume of your system.

Balanced — calcium and alkalinity in one bottle

Product	Solution	For 1 dKH in 100 L
Tropic Marin — All-For-Reef Powder	powder: 160 g to 1 L	16.7 mL
Tropic Marin — Carbo-Calcium	powder: 140 g to 1 L	16.7 mL
Tropic Marin — All-For-Reef	ready-mixed liquid	17.85 mL
Fauna Marin — Ready2Reef	ready-mixed liquid	17.85 mL
Barrak — ONE	powder: 150 g to 1 L	≈ 17.85 mL
Aviv Reef — Total Reef	ready-mixed liquid	≈ 17.85 mL

Alkalinity only

Product	Solution	For 1 dKH in 100 L
Triton — Core7 Base Elements 2	ready-mixed liquid	5.1 mL
Barrak — BUFFER	Barrak solution	6.25 mL
Barrak — Balling B (KH)	ready-mixed liquid	6.3 mL
Brightwell — Alkalin8.3	ready-mixed liquid	8.5 mL
Seachem — Reef Carbonate	ready-mixed liquid	8.9 mL
ESV — B-Ionic Alkalinity	ready-mixed liquid	12.8 mL
Aquaforest — KH Plus	ready-mixed liquid	20 mL

Product	Solution	For 1 dKH in 100 L
Fauna Marin — Balling Light Carbonate	powder: 100 g to 1 L	20 mL
Red Sea — Foundation B (KH)	ready or powder 100 g/L	29.4 mL
Triton — CO3	ready-mixed liquid	33 mL
Tropic Marin — Original Balling B	powder: 76 g to 1 L	35.7 mL
Aquaforest — KH Buffer	powder: 80 g to 1 L	38.5 mL
Seachem — Reef Builder	powder: 40 g to 1 L	71 mL
MBreda — Reef Basis B	powder: 50 g to 1 L	71 mL

CAUTION

How to read the table

The ≈ marks a derived figure. Barrak ONE and Aviv Reef Total Reef publish no yield; those values come from comparing labels of equivalent products in the same family. Confirm by measuring, as in the box further down.

For a powder, the millilitre depends on the recipe. Where the maker publishes a dilution, the table uses theirs. Where none is published — MBreda Reef Basis B — the table adopts 50 g topped up to one litre, a comfortable dilution well clear of the point where the salt crystallises inside the dosing line. If yours differs: **mL for 1 dKH = table mL × table g/L ÷ your solution's g/L**.

A starting daily dose is not a yield. Several labels open at 5 mL per 100 L **per day** — that is the tank's estimated consumption, not the volume that raises 1 dKH. Swapping one for the other makes the equipment wrong by several times over.

BACKGROUND

The ones that are part of a bigger system

Core7 2, Balling B, Foundation B, B-Ionic Alkalinity and Balling Light Carbonate raise alkalinity alone — each is one part of a set. If the Aquarino KH corrects KH with those on their own, calcium and magnesium fall behind; keep dosing the other parts through your usual system. The balanced products in the first table do not have this problem.

EXAMPLE

Doing the maths

An aquarium with **300 litres** of water in the system, using **Tropic Marin All-For-Reef** (17.85 mL per 100 L).

300 ÷ 100 = 3 · 3 × 17.85 = **53.55 mL**.

Enter **54 mL** in the mL to raise 1.0 dKH field.

CAUTION

Use the real volume, not the tank's nominal size

What matters is the volume of **water actually in the system**: display plus sump, minus rock, sand and unused space. In practice it tends to be 20 to 30% below the tank's nominal figure.

Getting this number too high makes the equipment underdose; too low makes it overdose. When in doubt, err high — underdosing is the safer failure.

TIP

Measuring the yield of your own product

This works for any product outside the table. Measure KH, dose a known volume by hand — 20 mL per 100 litres of system water is a good start — wait for it to settle, and measure again. **Yield = volume dosed ÷ change in KH.**

If 60 mL in a 300 L system raised KH by 0.4 dKH, then 1 dKH takes 150 mL. With organic products — All-For-Reef, Ready2Reef — wait 24 hours before measuring: the alkalinity only shows up once bacteria have metabolised the product.

16.8 The first day and day to day

Situation	What happens
First hours	Right after it is turned on, the doser already starts dosing, learning from the stored measurements and from the new ones. In about **one day** it knows your aquarium's rhythm
Restarting the device, calibrating the probe or changing the target	Nothing special: the next measurement decides like any other. The hours the device was off have no dose
Turning CO2 Port control on or off	It starts learning again and, in about a day, knows the aquarium's rhythm once more
Re-test	When a measurement is discarded and redone (section 14.2), the discarded reading does not dose. The measurement that confirms it decides the dose, already counting the time that has passed

Situation	What happens
Late measurement	If the measurement is delayed — for example, because another equipment cycle is in progress —, the dose goes out together with it

16.9 Automatic protections

Situation	What the doser does
Daily dosing limit	Everything the pump delivers in 24 hours has the ceiling you chose (section 16.3). When it reaches it, the doser pauses and warns you
Limit per dose	Each dose also has a ceiling, so that a wrong volume or a pump delivering too much does not turn into a large dose
KH above target	With the reading above the target plus half the margin, that hour goes without a dose; the next measurement decides again
No measurement	Does not dose: the dose only exists together with the measurement. If the measurement fails, you receive the error warning
Not enough product in the bottle	The dose is not given, and you are told (section 16.10)
Pump not calibrated	Does not run, and the home screen shows **Calibrate**
Very small dose	Doses smaller than 0.1 mL are not given: the pump cannot deliver them
Probe calibration overdue	Nothing changes in the doser. The calibration reminder arrives by e-mail

16.10 What you see

On the home screen

The **KH Buffer** indicator shows how much is left in the bottle:

The indicator shows	Meaning
Percentage	How much is left in the bottle. It turns red below the percentage in **Custom.** → **Low KH Buffer %**, and you get a warning
OFF	The doser is off, or the bottle has run out
Calibrate	The pump has not been calibrated yet and will not dose (section 16.6)



The KH Buffer indicator on the home screen in its three states: the bottle percentage, OFF with the doser off, and Calibrate with the pump not calibrated.

In the event log, the e-mail and the graph

Where	What appears
Event log	Each dose, with the volume and how much it raised — for example, `Alkalinity doser: 10.2 ml (+0.102 dKH)`. When the daily dosing limit is reached, `Alkalinity doser: daily maximum reached` appears; when it frees up, `Alkalinity doser: daily maximum released`
Notification on Dosing	If you turn it on, you receive the e-mail of each measurement that had a dose, with the dose written in it — up to 24 a day. Great in the first days, to build confidence; then turn it off
Graphs	The **Buffer (mL)** parameter shows how much was dosed over time, with the period total on its card (Chapter 21)

> **CAUTION**
> If what is left in the bottle does not cover the dose, the dose is not given and the log gets a line, once. The doser doses again when you refill the bottle and tap **Refill**. Without the **Capacity** filled in, the device does not know when the bottle runs out. With the capacity at zero, the **Reservoir** block shows **Automatic**, and the bottle drawing turns neutral, dashed, with **Auto** in the centre: the doser doses without tracking the level and does not warn when the bottle runs empty. The block only appears with the doser on, in Normal or Fast mode. When the bottle falls below the percentage in **Custom.** → **Low KH Buffer %**, you receive an e-mail. It does **not** stop measuring — you keep seeing KH fall in the graph, which is exactly the alert you need to see.

CHAPTER 17

Calcium reactor through the CO2 Port

For anyone running a calcium reactor, the Aquarino KH controls the **CO2 Port** — a power outlet that switches on and off according to what the aquarium needs. It is the equipment's most sophisticated feature and the one that most reduces your manual work.

17.1 The decision, in one sentence

At every measurement, the equipment decides **how many minutes the CO2 port stays on** until the next one.

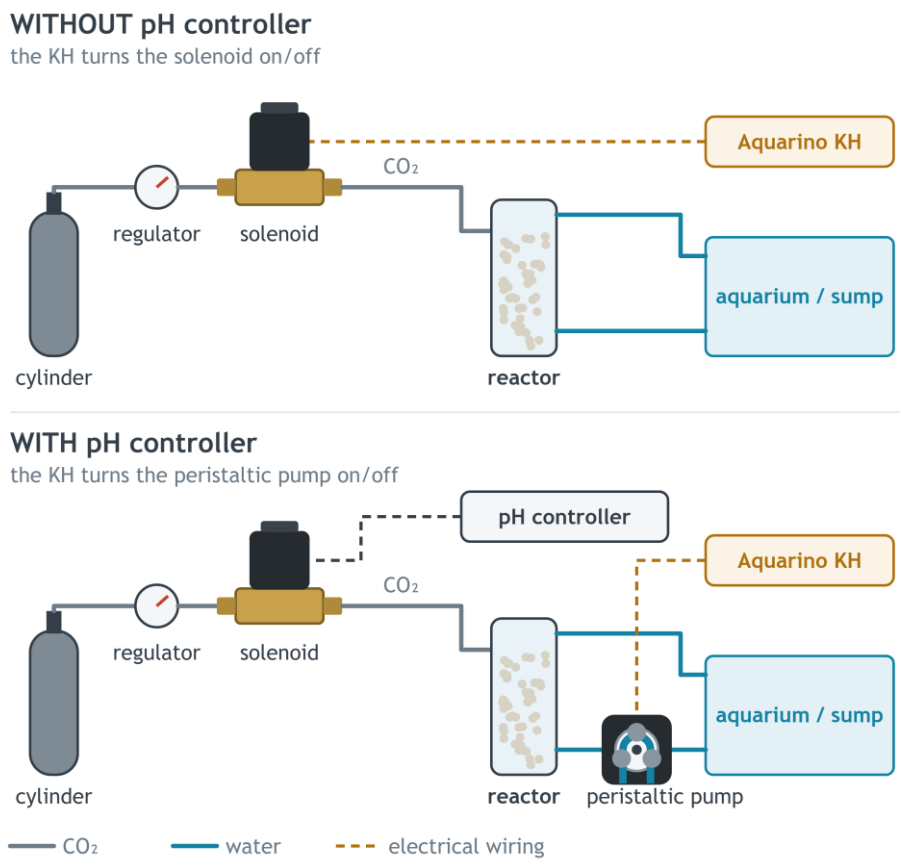
	What happens
1 · Measures	The aquarium KH, every hour, 24 hours a day
2 · Decides	Compares it with your target and with what happened over the last 24 hours
3 · Drives	Switches the port on for the calculated time. It switches off by itself

That is **24 decisions a day**, 8,760 a year. There is no factory table and no programmed schedule: each unit builds its own model from what it measures in your aquarium. Two aquariums with the same target receive CO2 in different amounts and at different hours, because they consume differently.

> BACKGROUND
> You configure nothing beyond the **KH target** and the **margin**. The equipment works out the rest on its own — and if your aquarium changes, with more corals or a new photoperiod, the model readjusts within a few days.

17.2 How to connect — pick your scenario

Your reactor	What to plug into the CO2 Port
Without a pH controller	Connect the **CO2 solenoid** directly to the CO2 Port. The equipment decides, every hour, how long to release CO2 into the reactor.
With a pH controller	Leave the solenoid with your pH controller and connect the **peristaltic pump** to the CO2 Port. The equipment then releases or cuts the reactor's water flow for the time needed.



The two scenarios. Without a pH controller, the Aquarino KH drives the CO2 solenoid. With a pH controller, the solenoid stays with it, and the Aquarino KH drives the peristaltic pump that feeds the reactor.

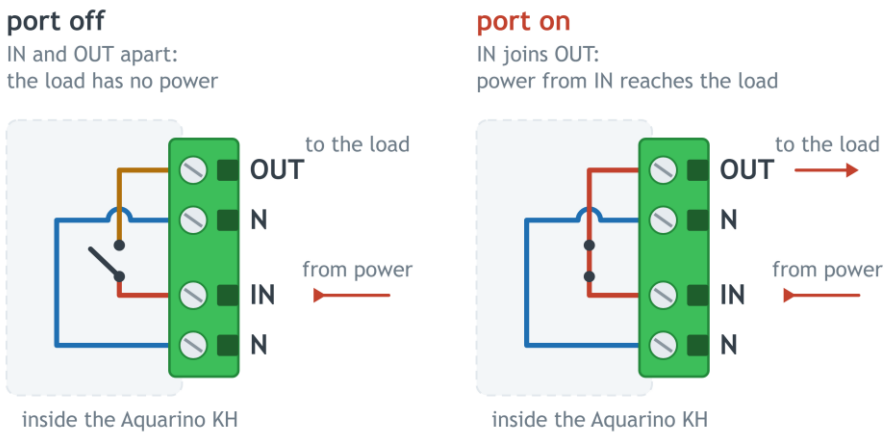


The CO2 Port screen explains both wiring scenarios and the ideal operating ranges.

How the CO2 Port works

The CO2 Port is a **switch**. When the equipment switches the port on, the **IN** terminal is connected to the **OUT** terminal; when it switches off, the two are kept apart. The two **N** terminals are connected to each other inside the equipment and simply pass the second wire through.

The Aquarino KH **does not supply power** on this port. Power comes from outside, through IN, and leaves through OUT exactly as it came in: if you connect a 220 V outlet to IN, 220 V comes out of OUT; if you connect a 12 V power supply, 12 V comes out. That is why the solenoid or the pump must be rated for the same voltage you feed into the input.



Inside the CO2 Port: a switch between IN and OUT. The two N terminals are connected to each other and do not go through the switch.

The four terminals

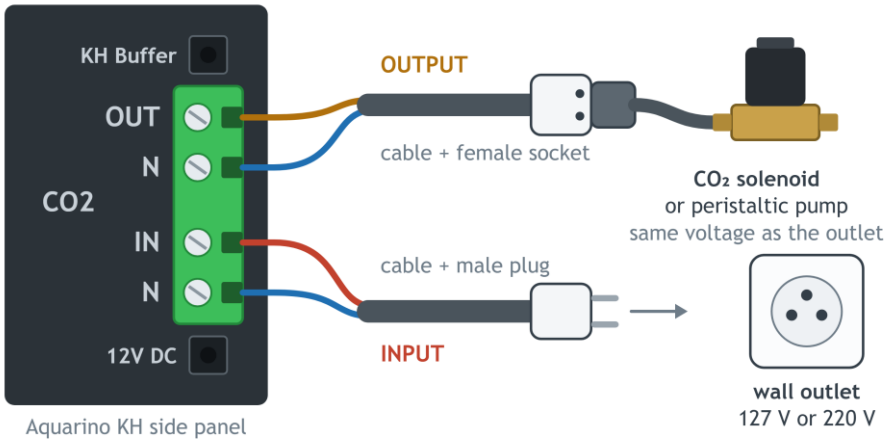
The green connector comes off the panel when you pull it outward, and the wires are held by the connector's own screws. The order, from top (KH Buffer side) to bottom (12V DC side), is:

Terminal	What to connect
OUT	One wire of the cable going to the solenoid or the peristaltic pump
N	The other wire of the same cable
IN	One wire of the cable bringing in power: wall outlet or power supply
N	The other wire of the same cable

In practice: **the top pair is the output, the bottom pair is the input**, and each cable takes one pair of neighbouring terminals.

Wiring with a wall outlet (127 V or 220 V)

This is the setup most users build, with two two-wire cables of about 1 metre each: one with a **male plug** at the end, which goes into the wall outlet, and another with a **female socket** at the end, where you plug in the solenoid or the pump.



Wiring with a wall outlet. The cable with the male plug goes on the bottom pair (IN and N) and brings in power. The cable with the female socket goes on the top pair (OUT and N) and powers the solenoid or the pump.

33 Keep both cables **unplugged from the wall** during the whole assembly.

34 Remove the green connector from the panel by pulling it outward.

35 Strip the end of each wire just enough for the copper to go fully into the terminal, with no bare copper left showing outside.

36 Cable with the male plug: one wire in **IN**, the other in the **N** just below it. If your installation identifies the live wire, put the live wire in IN; with a two-pin plug, the order of these two wires does not affect operation.

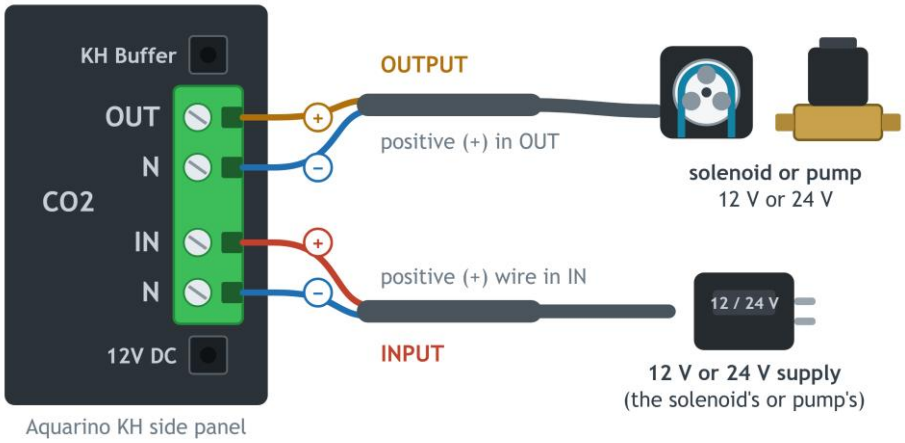
37 Cable with the female socket: one wire in **OUT**, the other in the **N** just below it.

38 Tighten the screws firmly and pull each wire gently to check it is held.

39 Fit the green connector back into the panel, plug the solenoid or the pump into the female socket and, last of all, plug the male plug into the wall outlet.

Wiring with a 12 V or 24 V power supply

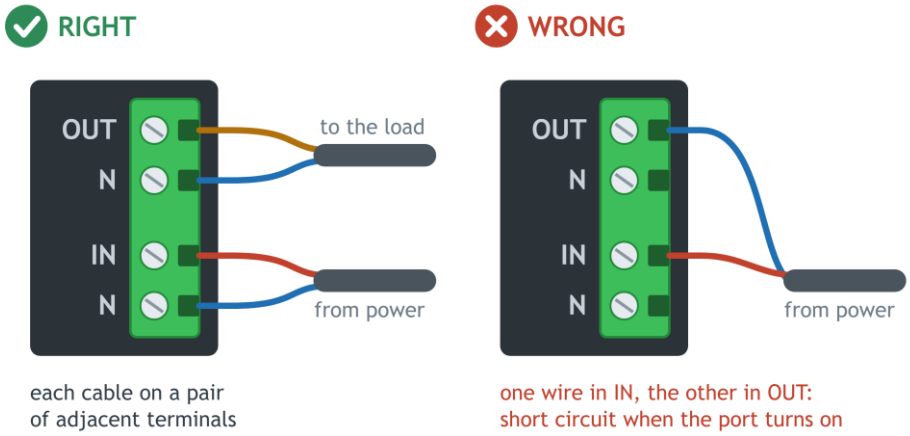
If your solenoid or pump runs on its own 12 V or 24 V power supply, the supply takes the place of the wall outlet: the supply wires go on the bottom pair and the load wires on the top pair. Here **polarity matters**: supply positive in **IN**, negative in **N**; load positive in **OUT**, negative in **N**.



Wiring with a 12 V or 24 V power supply. The supply positive goes in IN and the load positive in OUT; both negatives go in the N terminals.

> **TIP**
>
> A direct-current peristaltic pump wired with reversed polarity **turns backwards** and pushes the water the wrong way. If the pump runs but the reactor gets no water, swap the pump's two wires.

The mistake you must avoid



On the left, the correct wiring: each cable on a pair of neighbouring terminals. On the right, the mistake: the power cable with one wire in IN and the other in OUT.

> CAUTION
>
> **Never connect the power cable to IN and OUT**
>
> With one wire from the outlet in IN and the other in OUT, nothing happens while the port is off. The moment the equipment switches the port on, IN and OUT meet and the outlet is **short-circuited**: the circuit breaker trips and the internal switch may burn out.
>
> Before plugging into the wall, check: both wires of the power cable sit **together on the bottom pair** (IN and N).

Limits and precautions

- Maximum port load: **5 amperes**. An aquarium CO2 solenoid or peristaltic pump draws far less than that.
- The solenoid or the pump must be rated for **the same voltage** you feed into IN.
- Connect only the reactor's solenoid or pump to the CO2 Port. It was not designed for heaters, lighting or other equipment.
- Only handle the green connector with both cables **unplugged from the wall**.

Test after wiring

Before handing the reactor over to automatic control, confirm the wiring works. With **Correction mode disabled**, the port follows the **Default status** (section 17.13):

40 Change the Default status to **On**: the solenoid should click, or the pump should start turning.

41 Set the Default status back to **Off**: the solenoid should click again, or the pump should stop.

42 If nothing happens, check that the input cable is plugged into the wall and that each wire is in the right terminal.

17.3 What it looks at to decide

Two things, and each answers a different question.

What it looks at	The question it answers	Why it helps
Where KH is now	Where are we?	A single reading, compared with the target. It is trustworthy right away, because the reading error is well below the margin — and it is what makes the equipment react quickly to a water change
Where it went over 24 h	Where are we heading?	The difference between KH now and KH 24 hours ago, discounting what the doser added. It is what stops the equipment chasing noise

17.4 Why 24 hours, and not 1 hour

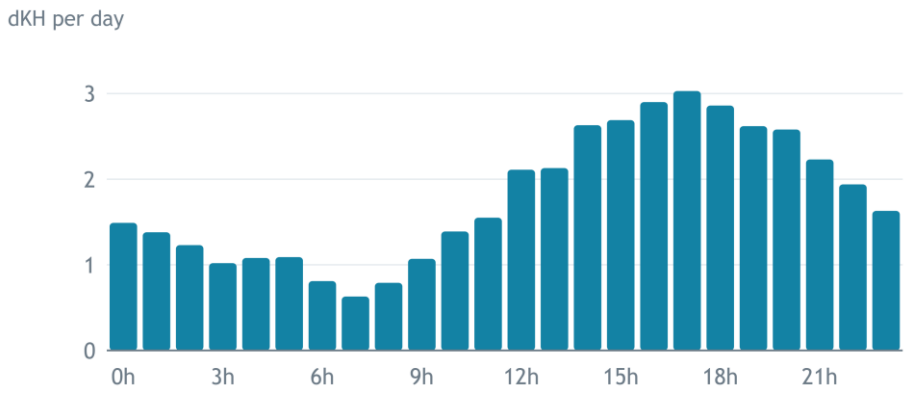
Two reasons, and both belong to the aquarium — not to the equipment.

Reason	Explanation
Noise	Over 1 hour, the natural variation of the reading is larger than the real consumption of that period: measuring the rate in that window would be reading noise dressed as information. Over 24 hours the signal is roughly **14× larger** than the noise.
Photoperiod	Corals consume with the lights on and almost nothing in the dark. A 12-hour window overnight would give nearly zero; 12 hours of daylight would give double the average. Over 24 hours the whole day enters once and the effect cancels itself.

> BACKGROUND
> This is why the equipment **never changes CO2 abruptly** from one hour to the next. It corrects gradually, and it is the sum of those adjustments that closes the day.

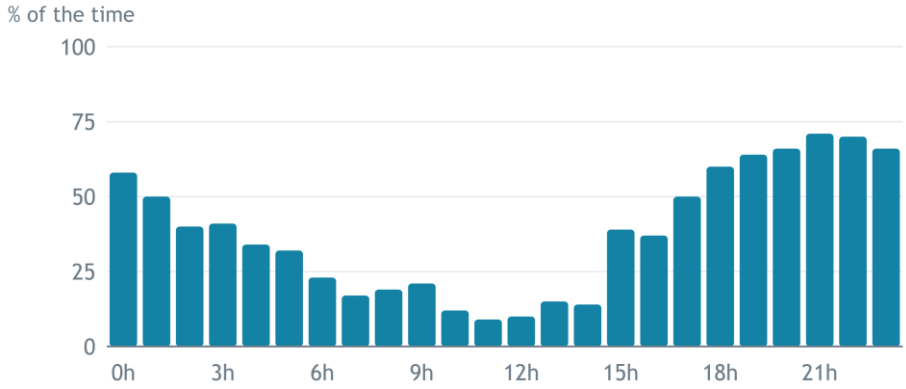
17.5 It learns your aquarium's routine

Nobody programs a lighting schedule. The equipment discovers your aquarium's rhythm from how it responds — and the photoperiod curve appears on its own in the data.



Alkalinity consumption by hour of day in a real aquarium, measured by the equipment itself over weeks. Peak at 17:00, minimum at 07:00 — a ratio of 4.8 to 1 between them.

Knowing which hours the aquarium consumes most, the equipment delivers more CO2 in exactly those hours:



Average percentage of time with the port on, by hour of day, in the same aquarium. The distribution is learned, not configured, and refines itself over the days.

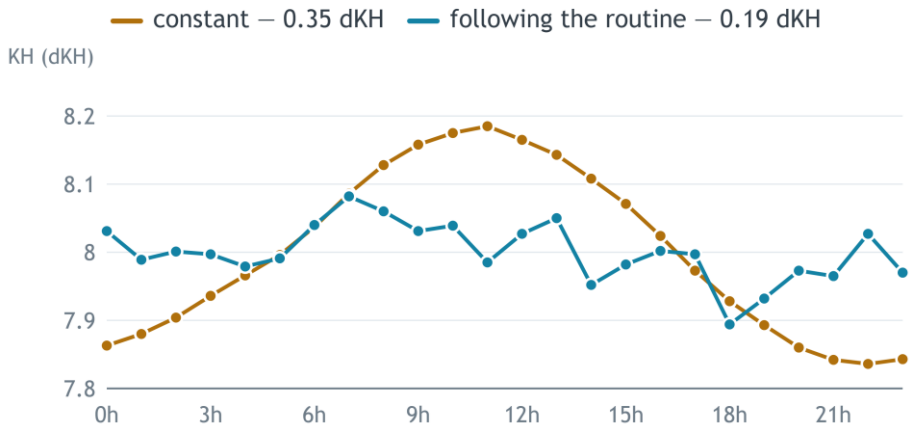
IMPORTANT

The distribution never increases the daily total

Delivering more CO2 in one hour **forces** less in another. The daily routine only redistributes the total; what sets that total is how far you are from your target.

17.6 The result: KH swings less

Same aquarium, same total CO2 for the day. Only the hours it is delivered change — and the difference shows in stability:



KH across one day, in the same aquarium and with the same total CO2. Distributed along the routine, the swing falls from 0.35 to 0.19 dKH.

Less swing across the day means less stress for corals: KH spends more time near the target and less time at the extremes.

17.7 Three safety stops

None of them depends on you configuring anything.

Stop	What it does
Daily limit	The equipment never tries to move KH by more than 1 dKH a day. More CO2 means more acid entering the aquarium — reactor effluent leaves at a pH near 6 — and abrupt alkalinity change stresses corals
Automatic cut	If KH climbs well above your target, the port is cut immediately and only returns once KH comes down. It does not wait for the next measurement
Distribution does not add up	The daily routine can reorganise the total, never increase it

17.8 Ideal range and adjusting the bubble counter

Your job here is **just one thing**: set the reactor's bubble counter so the port works within the recommended range. Do that, and the equipment handles the rest.

Period	Ideal range	Why
During the photoperiod	75% – 90%	With the lights on consumption is higher — the port should run in the upper range
Outside the photoperiod	15% – 30%	With the lights off consumption falls — the port should run in the lower range

> TIP
>
> **The golden rule of adjustment**
>
> If during the photoperiod the values sit **above the ideal range**, increase the amount of CO2 bubbles on the reactor valve.
>
> If they sit **below**, reduce the bubbles.
>
> That way the artificial intelligence always works inside the recommended range, with room to correct in both directions.

17.9 How to read the port percentage

Four readings cover almost everything you will see day to day:

What you see	What it means	What to do
It varies a lot across the day — 10% in the morning, 70% at night	Normal. That is your aquarium's routine, learned	Nothing
It sits at 0% for some hours, with KH above target	Normal. It is correcting downward, on purpose	Nothing

What you see	What it means	What to do
It climbs day after day and KH barely follows	The aquarium started consuming more, or the reactor is losing strength	Watch for 2 to 3 days
It sits at 100% for hours and KH does not rise	The reactor has reached its limit. Software cannot fix this	Check CO2, media and flow

BACKGROUND

The percentage shown is always the **last decision** — the plan that holds until the next measurement. Right after switching the equipment on, the value displayed is still the previous decision; the new one takes effect at the following measurement.

17.10 How to read the graph across days

The shape of the graph tells the story. Three shapes matter:

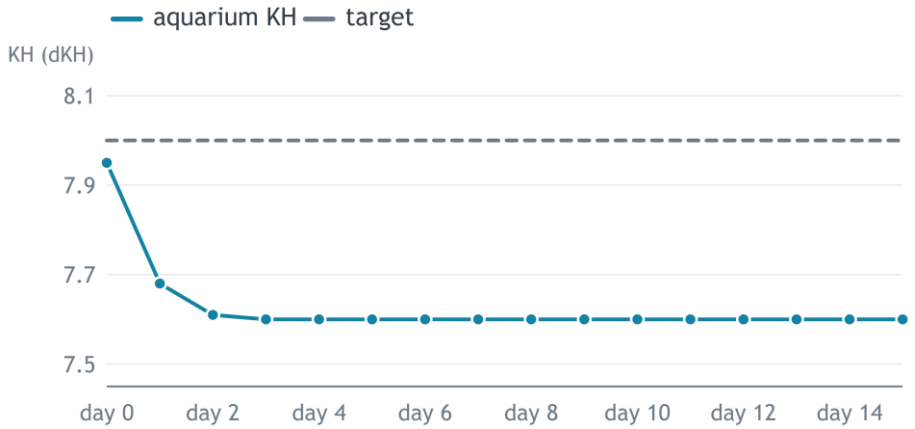
Shape	What it is	What it means
Wavy and steady	Rises and falls every day in the same pattern, with no long-term trend	This is the healthy state. The equipment found its point and is holding it
A step up, then settles	Climbs over a few days and then stabilises at a higher level	The aquarium started consuming more and the equipment followed. Expected after coral growth or a lighting change
Climbing without stopping, touching 100%	Grows day after day and starts hitting the ceiling often	The reactor is falling behind. Check CO2, media and flow before KH drops

TIP

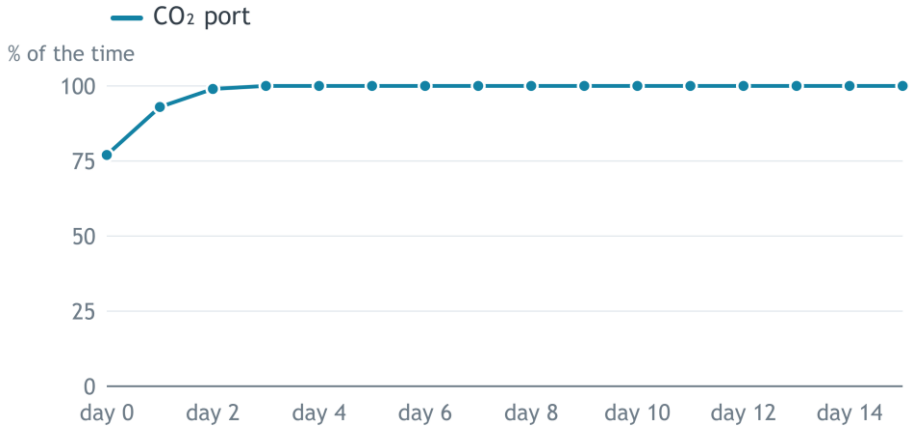
Read the CO2 Port graph **together** with the KH graph. It is the combination of the two that tells you whether the equipment is in control or asking for help.

17.11 When the reactor cannot keep up

This is the case where the equipment needs you. It shows the symptom; the cause is physical.



Aquarium KH against the target, day by day: alkalinity settles below target and stops rising.



Percentage of time with the port on over the same period: it climbs to 100% and stays there, day after day.

What to check, in this order:

- CO2 cylinder empty or low on pressure;
- Calcium media exhausted;
- Effluent flow too low;
- Reactor undersized for the aquarium's volume.

BACKGROUND

Why the equipment does not warn you by itself

A reactor at its limit and an aquarium that simply needs a lot of CO2 produce **exactly the same reading**. The equipment keeps delivering the maximum, which is the right answer in both cases — and records everything, so you can see in the history what happened.

The unmistakable sign is the combination: port at 100% for days on end **with KH stuck below target**.

17.12 What the equipment does not do

Does not	Detail
Does not guess your lighting schedule	It learns the routine from the aquarium's response. If you change the photoperiod it takes a few days to relearn — and relearns on its own
Does not diagnose the reactor	It shows that the port is at maximum and KH is not rising. The conclusion about CO_2, media or flow is yours
Does not replace your own reading	The equipment acts on what it measures. If the pH probe is poor, the measurement is poor — and so is the correction. Keep calibration current

17.13 Correction mode and default status

Setting	What it does
Correction mode	Enables or disables automatic control of the CO_2 Port. It ships **Disabled**
Default status	Sets whether the port stays **on** or **off** when automatic control is disabled, or when the equipment has no basis to decide — during filling, emptying, or right after startup

IMPORTANT

Choose the default status carefully

With control disabled and default status set to **On**, the port stays energised indefinitely, with no modulation — the reactor injects at the bubble counter's full rate.

If your reactor delivers more alkalinity than the aquarium consumes, that raises KH continuously. The equipment ships with default status **Off**, precisely so that a newly installed unit never injects CO_2 before someone has configured it.

CHAPTER 18

Integrating with other equipment

18.1 The KH-OUT port: KH becomes pH

The Aquarino KH has a side BNC port called **KH-OUT**. Through it the equipment emits an electrical signal just like a pH probe's — so your aquarium controller reads alkalinity through the pH input it already has, with nothing more than a cable.

> BACKGROUND
>
> **The conversion is direct: the number is the same**
>
> KH is sent **one to one** on the pH scale. An aquarium at **8.50 dKH** shows up on your controller as **pH 8.50** — there is no arithmetic to do and no table to consult.
>
> That is why the calibration uses precisely the pH 7 and pH 10 points: they anchor the scale, and between them each pH unit comes to mean one degree of KH.

Actual KH	The controller reads	Voltage at the BNC
7.0 dKH	pH 7.00	0 mV
8.0 dKH	pH 8.00	−57 mV
8.5 dKH	pH 8.50	−86 mV
9.0 dKH	pH 9.00	−114 mV
10.0 dKH	pH 10.00	−171 mV

The representable range runs from about **3 to 12.7 dKH**, which comfortably covers any reef aquarium.

18.2 Connecting to your controller

43 Run a BNC cable between the Aquarino KH's **KH-OUT** port and your controller's **pH input**.

44 On the controller, create or rename that input to something like `dKH` or `ALK` — so you never confuse it with a real pH probe.

45 Calibrate that input at two points, using the Aquarino KH's simulations (section 18.3).

46 Done: the value shown there is your KH.

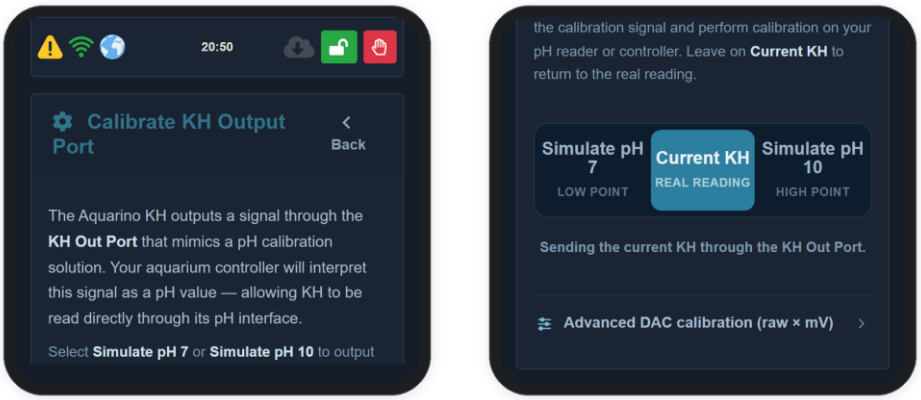
CAUTION

Turn off temperature compensation

Controllers usually correct the pH reading for water temperature — which makes sense for a real probe, and none at all for a simulated signal.

If your controller offers that option on the input (on the Apex it is **Temp Comp**; on the HYDROS it is the **Temperature Input** field), leave it **off**, or with no probe linked. Otherwise the KH shown will drift along with the aquarium's temperature.

18.3 Calibrating the port



The Calibrate KH Output Port screen, with the simulation points.

47 On the screen, select **Simulate pH 7**. The Aquarino KH starts emitting that point's fixed signal.

48 On your controller, set the **low** calibration point, entering the value 7.00.

49 Select **Simulate pH 10** and set the **high** point on the controller, entering 10.00.

50 Return to **Current KH** so the equipment resumes sending the real reading.

CAUTION

Do not forget to return to **Current KH** when you finish. While in simulation mode, your controller receives the calibration point's fixed value rather than the aquarium's KH.

TIP

Some controllers want a few minutes per point before they consider the reading stable. Since the simulated signal does not wander, this goes faster than with a real probe — but respect whatever your device asks for.

18.4 Compatibility with the controllers on the market

The KH-OUT port simulates the **pH 7 and pH 10** points — precisely the pair used in salt water, where pH lives around 8. Practically every aquarium controller calibrates that way, but it is worth checking yours before buying the cable:

Controller	Works?	Note
Neptune Apex (Classic, Jr, EL, A3, PM1)	Yes	You type the point values in during the calibration, and 7 + 10 is the pair Neptune itself recommends for salt water
CoralVue HYDROS (Control X2, X4, X10)	Yes	Calibrate the 7.01 first and the 10.01 second — the app requires that order — and send the changes at each point
GHL ProfiLux (3, 4, 4e)	Yes	The point values are configurable. Mind the resolution: the ProfiLux shows pH with one decimal place, so the KH also appears with just one
Aquatronica	Yes	The value you enter has to match the solution being used, and the 7 + 10 pair is one of those provided for
reef-pi	Yes	It accepts one-, two- or three-point calibration, with the values typed in by you — and it already comes with 7 at the mid point and 10 at the high one
Reef Angel	Yes	`PHMin` 7 and `PHMax` 10 are the default. Restart the controller after saving
Vertex Cerebra	Yes	Two BNC pH inputs, calibrated with the 7.01 and 10.01 solutions
Marine Assistant	Yes	A build-it-yourself controller with a BNC input; you choose the value of each solution during the calibration
IKS Aquastar	No	It identifies the solution on its own and recognises neither pH 9 nor pH 10 — its calibration is done with pH 4 and pH 7
Aqua Medic AT Control	Check	The solutions in the Aqua Medic line are 4, 7 and 9 — there is no pH 10 among them. Confirm on your own module before counting on the integration

TIP

The rule holds for any controller

If yours is not on the list, the test is simple: **open the pH calibration and see whether you type the point value in**. If you do, the KH-OUT port works. If the device already brings the values ready-made, check that the high point is 10 — and not 9.

It is not an electrical question: the KH-OUT signal is that of an ordinary pH probe, and it goes into any BNC. The only thing that decides is the calibration procedure.

CAUTION

A digital probe cannot receive KH-OUT

Some newer controllers have dropped the BNC. The **Red Sea ReefControl** (Lite and Pro) works exclusively with the ReefSense digital probes and has no analogue input — in that case there is nowhere to plug the cable in.

If your controller is like that, use the Aquarino app to follow the KH, and the Aquarino KH's own correction — doser or CO2 Port — to act (Chapters 16 and 17).

18.5 Creating rules on your controller

With the input calibrated, the rule is written on top of the pH number — which is your KH. If you want to act below 7.5 dKH, the condition is **pH lower than 7.50**.

Controller	Where you create it	Example
Apex	Configuration → Inputs to name the input, and the programming of the output	`If dKH < 7.50 Then ON` to trigger an extra dosing boost
HYDROS	Outputs, with the Calcium Reactor type pointing at that input	The off and on band for the CO2, around the desired KH
ProfiLux	Switch Channels and Outlets, pH-value function with Control Upwards or Downwards	Nominal value at the target KH, with whatever hysteresis you prefer
reef-pi	In the input's pH tab, with limits and hysteresis tied to a piece of equipment or to a macro	A macro that cuts the CO2 when the value goes past the upper limit
Reef Angel	In the sketch code	`if (ReefAngel.Params.PH < 750) ReefAngel.Relay.On(Port2);`

EXAMPLE

Cutting the reactor's CO2 by KH

On the Apex, with the input renamed to `dKH`, the CO2 solenoid output looks like this:

`Fallback OFF — Set ON — If dKH > 9.00 Then OFF`

That is: the CO2 runs normally and is cut when alkalinity goes past 9 dKH. It is the same logic the Aquarino KH applies on its own through the CO2 Port (Chapter 17) — the difference is that here it is your controller doing the work.

TIP

Who should be in charge of the correction

If you have both the Aquarino KH and a controller, avoid having the two of them correct the same parameter at the same time — they do not talk to each other, and they can fight.

The arrangement that usually works best: **the Aquarino KH corrects** (doser or CO2 Port) and the **controller watches**, with alarm and safety rules — cutting everything off if the KH leaves a wide band, for example.

18.6 Integrating with the Aquarino Controller

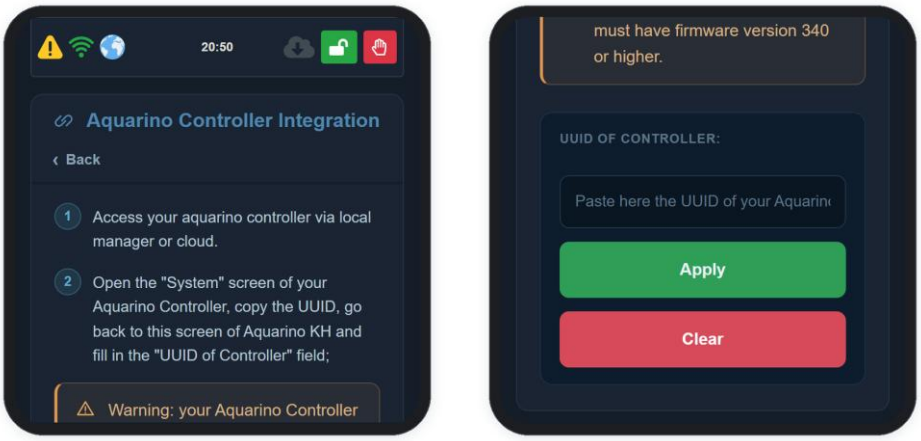
If you have an Aquarino Controller, the integration is direct and needs no cable:

51 Open your Aquarino Controller in the app.

52 Go to the Controller's **System** screen and copy the **UUID**.

53 Return to the Aquarino KH, under **Configuration → Aquarino Controller Integration**.

54 Paste the value into the **UUID of Controller** field and tap **Apply**.



The integration screen only asks for your Aquarino Controller's UUID.

CAUTION

Your Aquarino Controller must have **up-to-date firmware** for the integration to work.

TIP

With the UUID integration, alkalinity appears as a sensor of the Controller itself — it enters the charts, the automation rules and the home screen carousel, without taking up its pH input. If you have both pieces of equipment, this is the way to go: save the BNC port for something else.

CHAPTER 19

The first seven days

This chapter is a route. If you have just installed the equipment, follow it and by the end of the first week you will have an Aquarino KH tuned to your aquarium — and, more importantly, the confidence of knowing why it is tuned that way.

Day 1 — install and calibrate

- Install the equipment, the hose and the probe (Chapters 4 and 5).
- Install the app, create your account and add the equipment (Chapters 6 and 7).
- Run a **full calibration** with a chemical test you trust (Chapter 10).
- Set target and margin (Chapter 14). Leave correction **off** for now.
- Set the interval to **1 hour** and notification to **Always**.

> TIP
> Leaving correction off for the first days is deliberate: first you learn how your aquarium behaves, then you decide how to correct it.

Days 2 and 3 — observe

- Change nothing. Let the equipment measure.
- Once a day, open **Graphs** and look at the last 24 hours.
- Check the aeration in both chambers (Chapter 13) — it is the adjustment that most affects reading quality.

By the end of the third day you should be able to answer: what is my aquarium's daily KH swing, and does it follow the photoperiod?

Day 4 — check against the chemical test

- Run a chemical test at the same time of day and from the same collection point as the equipment.
- Compare it with the value measured at that hour.
- If the difference is within your kit's margin of error — it is given in the kit's manual —, all is well: **do not recalibrate**.
- If it is larger, run a **partial calibration** (Chapter 11).

Days 5 and 6 — turn correction on

- If you use 3-in-1 balling or want a safety net: turn on the **Alkalinity Doser** in **Normal** mode, calibrate the pump and enter the mL to raise 1 dKH (Chapter 16).
- If you use a calcium reactor: enable the **CO2 Port** and start watching the hourly percentages (Chapter 17).
- Follow the event log in **Logs** to see the decisions the equipment is making.

Day 7 — adjust and settle

- Calcium reactor: set the bubble counter so the port lands in the ideal ranges (75–90% during the photoperiod, 15–30% outside it).
- If you have another replenishment system: look at the Buffer (mL) parameter in Graphs. If the doser is dosing more and more, check your main system — it is what is letting KH fall.
- Change notification from **Always** to **Off target**.
- If the system is steady, you can raise the measurement interval to 2–4 hours — unless you are using the CO2 Port or the Alkalinity Doser, which measure every hour.

> BACKGROUND
>
> **What to expect after the first week**
>
> CO2 Port control is incremental by nature: it learns your aquarium's consumption over days and walks to its balance point gradually, rather than jumping. It is normal for this to take **a few days** to settle.
>
> Resist the urge to change settings every day. Adjust, watch for 48 hours, and only then adjust again.

PART VI

Getting to know the screens

Where each piece of information lives, and what it is telling you.

20 Home screen

21 Graphs

22 Logs

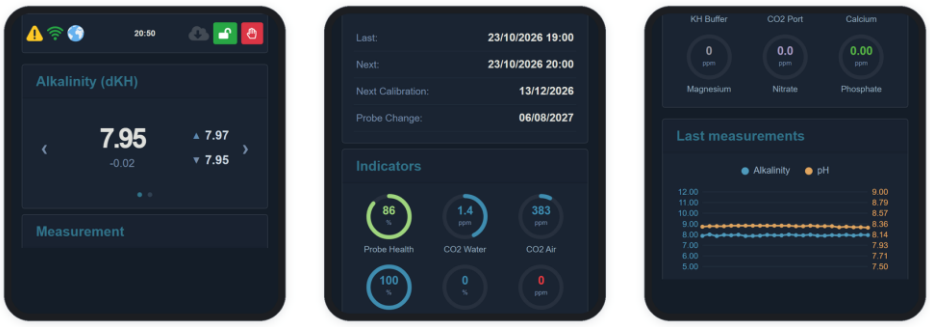
23 Custom. — preferences

24 System and Status

CHAPTER 20

Home screen

The home screen exists to answer, in three seconds, the question you ask every morning: **is my aquarium all right?**



The Home screen gathers alkalinity, the measurement in progress, indicators and recent history.

20.1 Status bar

Present on every screen, it shows four states of the equipment:

Icon	Meaning
Alert	Lit when KH is outside the band set by target and margin
Wi-Fi	The equipment is connected to your network
Internet	The equipment has internet access and can reach the Aquarino cloud
Update	A new version is available to install

On the right there are also the **screen lock** button, which prevents accidental taps, and the red **stop** button, which immediately interrupts whatever is running and switches everything off, including the **CO2 Port**.

20.2 Alkalinity

The main block shows the **current KH** in large type, in the unit you chose. Just below it is the **difference from the previous reading** — for example, **-0.02** — which shows at once whether KH has gone up or down since the last measurement.

Beside it are the **highest** and **lowest** values of the period, which show your aquarium's swing at a glance. Two close numbers mean a stable system; two distant ones, a system that oscillates.

20.3 Measurement

While a cycle is running, this block shows the **percentage complete**, the current stage and the **time remaining**. Outside a cycle it shows the date and time of the last and next measurement, and the suggested date for the next calibration.

If a measurement stops with an error, the block shows **ERROR**, the message and what to check, with the **Resolve and try again** button. While the error is there, the equipment does not measure, does not dose and does not drive the CO2 Port.

20.4 Indicators

Nine dials show the state of the parameters the equipment tracks:

Indicator	What it shows
Probe Health	Quality index of the pH probe, 0 to 100% (Chapter 12)
CO2 Air	Ambient CO2 concentration, in ppm. Between 400 and 600 ppm is usual indoors
CO2 Water	CO2 concentration in the aquarium water, in ppm
KH Buffer	How much is left in the Alkalinity Doser's bottle, as a percentage. Turns red below the configured limit. **OFF**: doser off or bottle empty. **Calibrate**: the pump has not been calibrated yet
CO2 Port	Percentage the port is driven for in the current hour (Chapter 17)
Calcium, Magnesium, Nitrate, Phosphate	Parameters **you enter manually**, from your own tests. The Aquarino KH does not measure these — it stores and displays them so you have the whole picture on one screen. The fields accept the ranges of reef aquarium test kits: calcium from 200 to 600 ppm, magnesium from 1000 to 1800 ppm, nitrate from 0 to 75 ppm and phosphate from 0 to 2.5 ppm

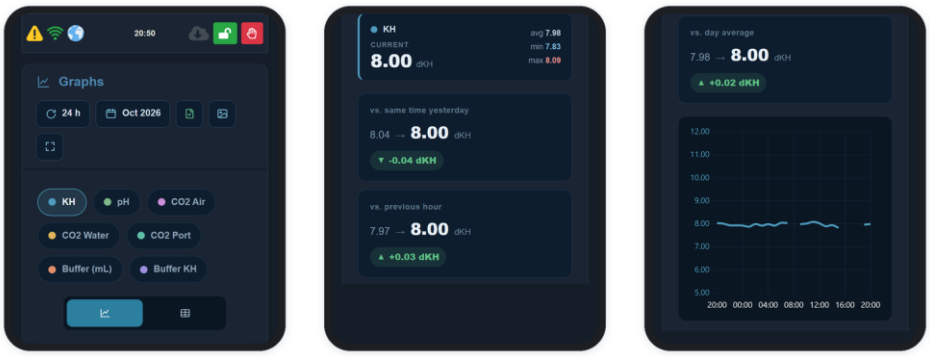
20.5 Last measurements

The line graph shows recent **alkalinity** and **pH** readings side by side. It is where the daily swing shows most clearly — and where you notice a trend before it becomes a problem.

CHAPTER 21

Graphs

If the home screen answers "is everything fine right now?", the graphs screen answers "what has been happening?". It is the equipment's most powerful tool for anyone who wants to understand their own aquarium.



The Graphs screen: period, parameters, cards, comparisons and the Chart, Table, Compare and Map modes.

21.1 Period and parameters

At the top, choose the **period — 24 h**, **7 days** or **30 days**, always within the selected month — and tap the parameters you want to see. You can select one or several:

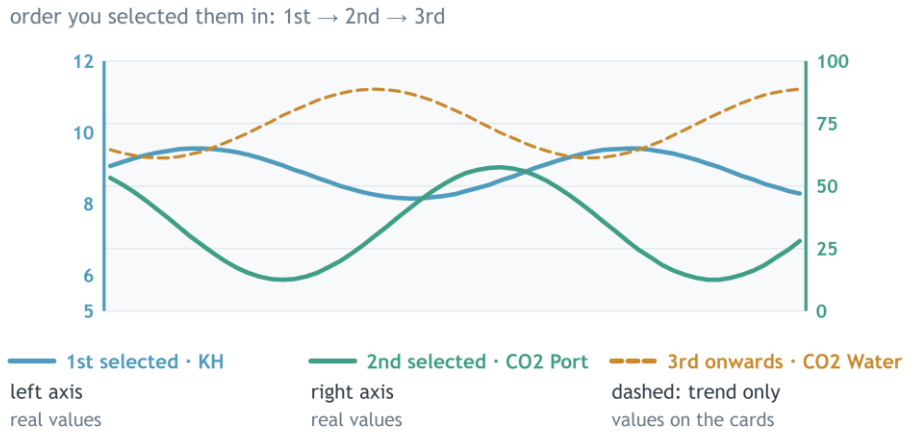
Parameter	What it records	Axis scale
KH	The measured alkalinity	Fixed, from 5 to 12 dKH — in your unit, about 89 to 214 ppm $CaCO_3$ or 1.8 to 4.3 mEq/L
pH	The aquarium pH (requires the probe to be calibrated)	Fixed, from 7.5 to 9
CO2 Air	Ambient CO_2	Automatic: adjusts to the values in the period
CO2 Water	CO_2 dissolved in the water	Automatic
CO2 Port	The port's drive percentage, hour by hour	Fixed, from 0 to 100%
Buffer (mL)	Volume delivered by the Alkalinity Doser	Starts at zero; the top adjusts
Buffer KH	How much alkalinity that dose represented	Starts at zero; the top adjusts

A **fixed** scale means the axis does not change from one day to the next: KH always appears in the same band, and you can compare different days by eye. An **automatic** scale stretches to the values in the period, so that small variations become visible.

Each parameter is drawn as a **continuous line**, with no markers on the points. To see the values for a given hour, **slide your finger** over the graph — or the mouse, on a computer: a box shows the time and the value of each selected parameter at that hour.

21.2 Which axis each one gets: the order you select them in

The graph has **two axes with real values** — one on the left and one on the right. What decides which parameter goes on each axis is **the order in which you select them**:



The axis rule: the 1st parameter selected takes the left axis, the 2nd the right axis, and from the 3rd onwards the lines are dashed, showing only the trend.

Order	Where it appears	How to read it
1st selected	The **left** axis	Solid line, with real values on the parameter's scale
2nd selected	The **right** axis	Solid line, with real values on the parameter's scale
3rd onwards	No axis of its own	**Dashed** line, showing only the **trend** — rising, falling, following the others. The real values are in the cards above the graph

If you deselect a parameter, the ones after it **move up one place**: the 2nd moves to the left axis, the 3rd gets the right axis, and so on.

The screen **opens with KH already selected**, and at least one parameter always stays selected: the last one cannot be deselected.

EXAMPLE

In practice

KH and CO2 Port: since KH is already selected, just tap CO2 Port. KH stays on the left and the port on the right, from 0 to 100%: on one screen you see KH rising when the port spends more time on.

CO2 Port on the left: tap CO2 Port and then deselect KH. To get KH back on the right, select it again.

KH, pH and CO2 Water: tap pH and then CO2 Water. KH on the left, pH on the right, and CO2 Water dashed, showing only whether it follows the other two. For its value, look at the card.

TIP

Select **the parameter that matters most first**: it gets the left axis and the grid lines. To compare just two, deselect the rest — both lines then carry real values.

21.3 The cards

Above the graph, each selected parameter gets a card in the same colour as its line:

Type of parameter	The large number	The smaller numbers
Readings — KH, pH, CO2 Air, CO2 Water, CO2 Port	The **current** value	Average, minimum and maximum for the period
Dosing — Buffer (mL), Buffer KH	The **total** dosed in the period	Average, minimum and maximum **per dose**

21.4 Automatic comparisons

With **a single parameter selected**, three comparisons appear just below, answering the most common questions without you having to interpret the graph. The badge turns **green** when the change is within what is normal for that parameter — for example, up to 0.15 dKH for KH:

Comparison	What it is for
vs. same time yesterday	Isolates the daily variation. If 3 pm today differs from 3 pm yesterday, something genuinely changed
vs. previous hour	Shows the recent movement — how fast KH is rising or falling
vs. day average	Places the current reading within its own day, separating the normal from the exceptional

Dosing does not get these badges: comparing one hour's dose with another's tells you nothing — what matters is the total and the pattern of doses, which are on the card.

21.5 Chart, Table, Compare and Map

The mode selector changes how you look at the same data. **Chart** and **Table** are always available. **Compare** and **Map** appear when you select **a single parameter** and choose **7 or 30 days** — they need several days to compare.

Mode	Available	Answers the question
Chart	Always	How did the parameters move over the period?
Table	Always	What was the exact value at each hour?
Compare	One parameter, 7 or 30 days	Does this time of day repeat the same every day, or swing? Is today out of the pattern?
Map	One parameter, 7 or 30 days	Is some time of day slipping, day after day?

> BACKGROUND
> If you are in Compare or Map and select a second parameter, the screen switches back to Chart on its own.

Table: the exact value at each hour

Each row is an hour with a measurement, **the most recent at the top**. The first column holds the time; the next ones hold one selected parameter each, in its colour and with its unit. It works with as many parameters as you like — on a phone, the table scrolls sideways.



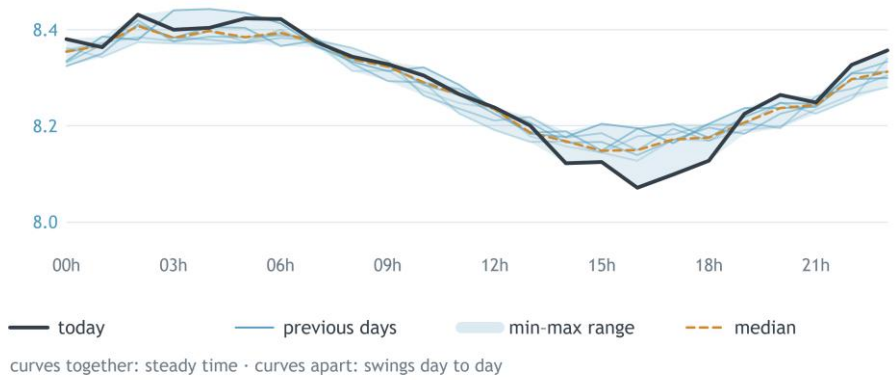
cloud: green sent, grey pending · most recent at the top

Example of Table mode with KH, CO2 Port and pH selected.

Detail	What it means
Cloud beside the time	Green: that measurement has already been sent to the Aquarino cloud. Grey: still pending, and it uploads by itself when the connection allows
CO2 Port with minutes	Beside the percentage are the equivalent minutes in the hour: 45% is 27 minutes with the port on
Dash (—)	That parameter has no reading at that hour

Compare: one day over another

Each day in the period becomes a curve, all overlaid on the same axis from **00h to 24h**. That way the same time on different days lines up one above the other.



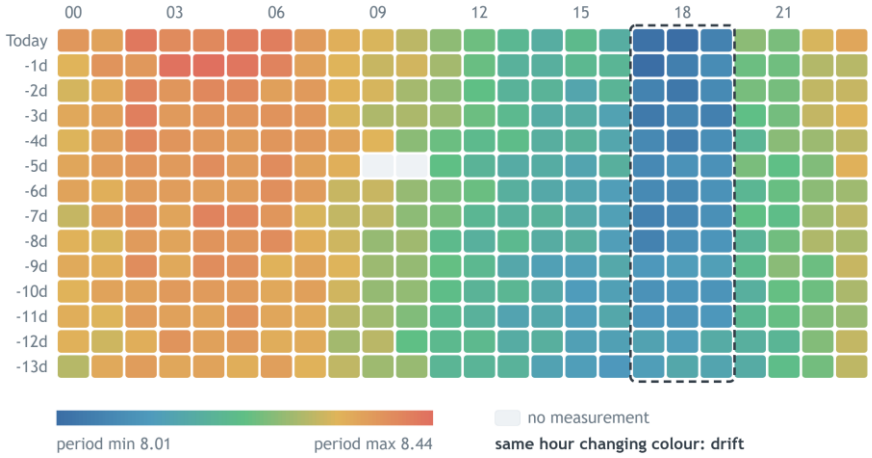
Example of Compare mode with KH over 7 days: the curves tighten in the morning and at night, and today breaks from the pattern in the afternoon.

Element	How to read it
Today's curve	Highlighted, thicker line
Previous days	In the parameter's colour, fainter the older they are
Min–max range	The shaded band: the minimum and maximum at each time of day over the period
Median	The dashed line: the median at each time of day, your aquarium's "typical day"

> TIP
>
> **Where to look**
>
> **Curves close together** at a given time: that moment of the day repeats steadily. **Curves spread apart**: there the parameter swings from one day to the next, and it is worth looking for the cause — photoperiod, dosing, reactor consumption.
>
> **Today far from the dashed line**: it is a day out of the pattern. A water change, a new coral or a forgotten dose usually show up here first.

Map: the whole period at once

Each **row is a day** — **Today** at the top, then -1d, -2d and so on — and each **column is an hour**, from 00 to 23. The colour of each square shows the value for that hour.



Example of Map mode with KH over 14 days. The highlighted column, in the late afternoon, gets darker every day: KH at that time is falling, even if the day as a whole looks normal.

How to read it	What it reveals
Across	A whole day, hour by hour
Down	The same time of day over the days. A column that changes colour from top to bottom reveals **drift**: the parameter slipping day after day at that time — something a single day's curve does not show
Blocks of even colour	Stability
Faded squares	Hours without a measurement

BACKGROUND

Colour is relative to the period

The colour bar runs from the **minimum** to the **maximum** seen in the period, and both values are written at its ends. The colour shows where each hour sits between those two extremes — **not whether the value is good or bad**. In a very stable period, small variations fill the whole bar.

Outside fullscreen, Map shows the 14 most recent days. In **Fullscreen**, the whole period is shown: Map is at its most useful over 30 days.

TIP

Table mode is the right way to check your calcium reactor's tuning: select **CO2 Port** and read each hour's percentage against the ideal ranges in Chapter 17.

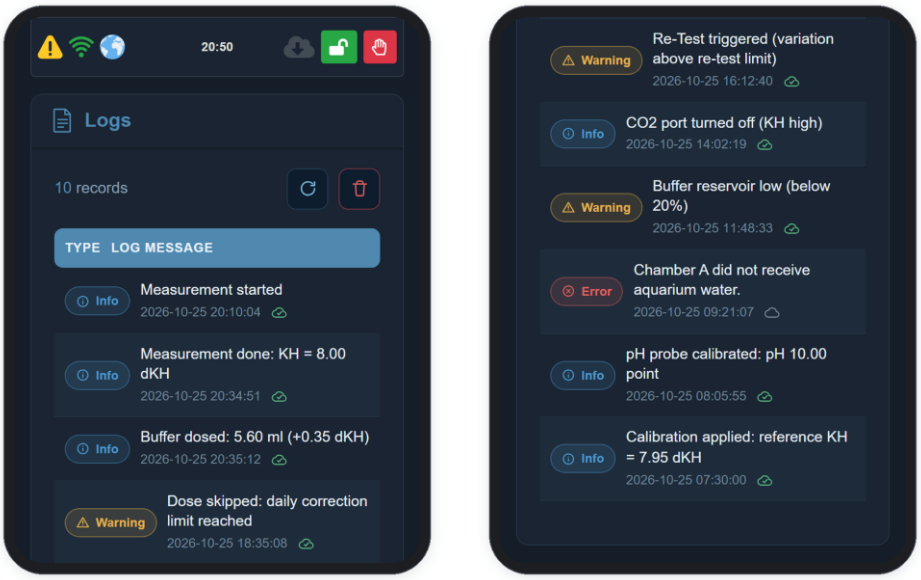
21.6 Exporting

The **Excel** and **Image** buttons export the history as a spreadsheet or as a picture, and the **Fullscreen** button enlarges the graph in any mode. The spreadsheet opens in Excel or Google Sheets and lets you build your own analyses, compare months and follow the system's long-term evolution.

CHAPTER 22

Logs

The event log tells you, in order, everything the equipment did and why. It is the first screen to open when something did not go as expected.



Each line carries the type, the message, the date and its cloud sync state.

Every record has a type — **Info** for normal operation, **Warning** for situations worth your attention and **Error** when something prevented the equipment from completing a step — and an icon showing whether it has been synced to the cloud.

22.1 Messages you will come across

Message	What it means
`Measurement started`	A cycle began
`Measurement done: KH = 8.01 dKH`	The cycle ended with that result
`Alkalinity doser: 10.2 ml (+0.102 dKH)`	The doser ran: the volume and how much alkalinity it represents, in the unit you chose, with one extra decimal place
`Re-test triggered (change above twice the tolerance)`	The reading differed from the previous one by more than twice the margin; the equipment discarded it and measured again
`CO2 port 45% (27 min)`	The CO2 Port plan for the coming hour (Chapter 17)

Message	What it means
`CO2 port 0% (0 min)`	The CO2 Port stays off for the coming hour — for example, because KH went above the target
`Alkalinity doser: reservoir does not cover the dose`	What is left in the bottle is less than that hour's dose, and the dose was not given. Refill the bottle and tap **Refill** (Chapter 16)
`Alkalinity doser: daily maximum reached`	The doser reached the daily dosing limit and paused: it only doses again when the oldest doses leave the 24-hour window (Chapter 16)
`Alkalinity doser: daily maximum released`	The 24-hour window freed up room and the doser started dosing again

TIP

The screen loads the most recent events first. Use **Load more** to walk further back. Above the list, the screen shows how many records you have loaded and how many exist in total — for example, **showing 10 of 2140**.

BACKGROUND

How far back the log goes

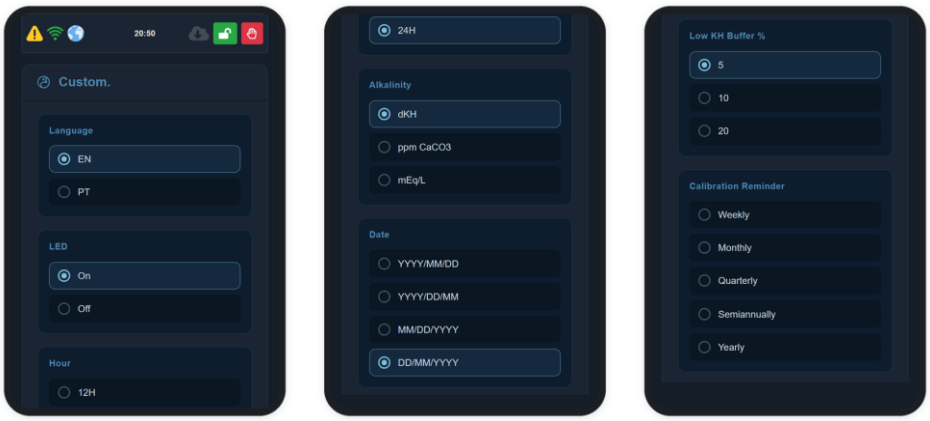
The log holds hundreds of thousands of events, which amounts to many months of normal operation. When it fills up, the equipment recycles the file: the history starts over, and the first new event records that this happened.

Because each event is sent to the cloud as it happens — that is what the sync icon on each line indicates — the history stays available in the app even after the recycling.

CHAPTER 23

Custom. — preferences

This screen holds display preferences. Nothing here changes how the equipment works — only how it presents itself to you.



The Custom. screen gathers language, units, formats and reminders.

Preference	Options
Language	Portuguese or English
LED	Turns the panel lights on or off. Useful if the equipment sits in a living space
Hour	12- or 24-hour format
Alkalinity	Unit of measurement: **dKH**, **ppm CaCO3** or **mEq/L**
Date	Date display format
Low KH Buffer %	The percentage at which the reservoir indicator starts warning: 5, 10 or 20%
Calibration Reminder	Reminder frequency: weekly, monthly, quarterly, half-yearly or yearly

BACKGROUND

About alkalinity units

The three units measure the same thing on different scales. The conversion is direct: **1 dKH ≈ 17.86 ppm CaCO3 ≈ 0.357 mEq/L**.

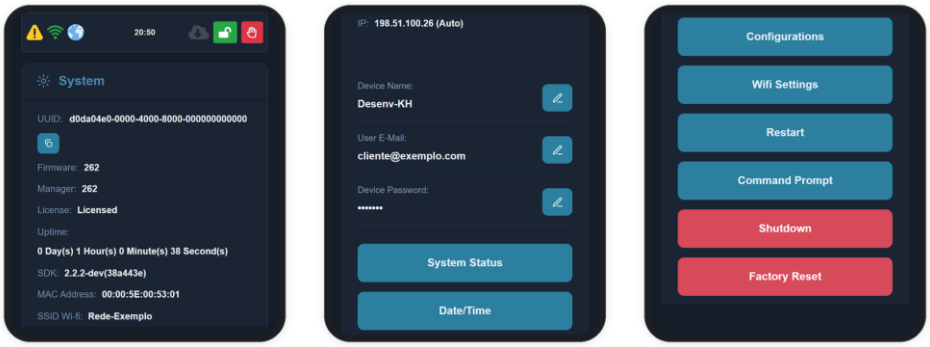
The choice is yours, but it is worth picking the same unit as your test kit — then you compare numbers directly, with no arithmetic in between.

CHAPTER 24

System and Status

24.1 The System screen

It holds the equipment's identification, its network details and the maintenance actions.



The System screen: identification, versions, network and maintenance actions. The identifiers in this image have been replaced with example values.

Information	What it is for
UUID	The equipment's unique identifier. It is what you give to support, and what you use for the Aquarino Controller integration
Firmware	Version of the equipment's internal system
Manager	Version of the interface
License	Licensing status. Equipment registered with your e-mail shows as **Licensed** — if it shows otherwise, check the User E-mail field (Chapter 6)
Uptime	How long the equipment has run without restarting
MAC address	Network identity. This is what you use to reserve its IP on your router
SSID / IP	The network it is connected to and the address to reach it

Available actions

Button	What it does
System Status	Opens the detailed diagnostics (section 24.2)
Date/Time	Sets the internal clock
Configuration	Shortcut to the configuration screen

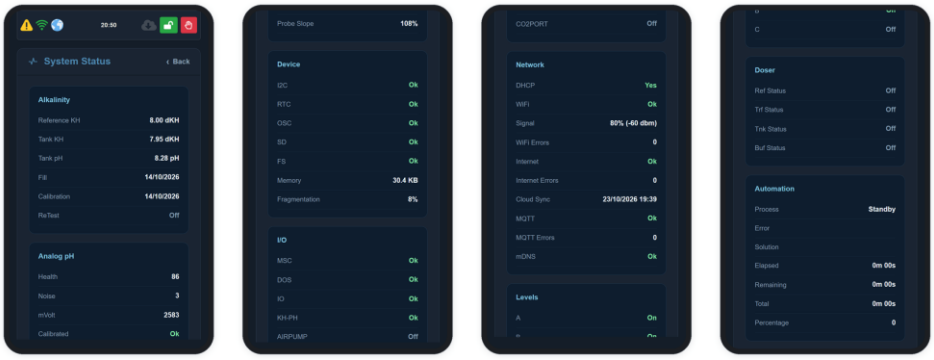
Button	What it does
Wifi Settings	Changes the Wi-Fi network
Restart	Restarts the equipment. No settings are lost
Shutdown	Ends operation safely before you unplug it
Factory Reset	Erases **all** settings and returns to the original state

> IMPORTANT
> **Factory Reset** erases calibration, target, doser and CO2 Port settings, and the network details. After it you will need to redo the whole installation, including a full calibration. Use it only when support tells you to.

> TIP
> Before unplugging the equipment for maintenance, use **Shutdown** rather than simply cutting power. That way it closes any operation in progress and writes everything safely.

24.2 System Status

This is the diagnostics screen. You will probably never need it — but when you do, it is the one support will ask you to open.



System Status groups alkalinity, probe, device, inputs and outputs, network, levels, dosers and automation.

Block	What it reports
Alkalinity	Reference KH, tank KH, pH, fill and calibration dates
Analog pH	Health, noise, millivolts, whether it is calibrated, and probe slope
Device	Internal health: I2C, clock, memory card, filesystem, free memory and fragmentation
I/O	State of inputs and outputs, including the air pump and the CO2 Port

Block	What it reports
Network	DHCP, signal quality, error counters, last cloud sync and MQTT state
Levels	Level sensors for chambers A, B and C
Doser	State of each dosing pump
Automation	Process in progress, error, elapsed and remaining time, and percentage

TIP

What to look at first

Trouble reaching it through the cloud? Look at the **Network** block: signal quality, Wi-Fi and internet errors.

Graphs empty or not updating? Look at **SD** and **FS** in the Device block.

Measurements stopped? Look at the **Automation** block — the Error field says what stalled.

PART VII

Maintenance and support

Routine care, fixes for the common problems, and how to reach us.

25 Maintenance routine

26 Troubleshooting

27 Frequently asked questions

28 Specifications

29 Support and warranty

CHAPTER 25

Maintenance routine

The Aquarino KH asks little, but it asks regularly. This routine keeps measurements trustworthy over the years.

Frequency	What to do
Weekly	Look at the last 24 hours in the graph · check the aeration foam in both chambers · check the buffer reservoir level
Monthly	Run a chemical test and compare with the equipment · partial calibration if needed · inspect the chambers visually
Quarterly	Clean the chambers internally, then run a full calibration · check the doser tubing · calibrate the pH probe, if you follow your aquarium's pH (section 12.3)
Yearly	Replace the pH probe and log the replacement · replace the doser's internal tubing

25.1 Cleaning the chambers

55 Empty the reservoirs completely under **Configuration → Reservoirs → Empty**.

56 Open the lid and clean the inside of the chambers.

57 Close it, run **Fill** and perform a **full calibration** (Chapter 10).

There is a video of the procedure at **https://youtube.com/shorts/qm--dZ7LNUg**

25.2 Memory card

The card holds the history, the event log and the interface files. When it fails, the symptoms are characteristic: graphs stop appearing, updates do not complete, or System Status shows **SD: Not Detected**.

The fix is to format or replace the card. Talk to support first — in many cases we can identify the cause remotely.

25.3 pH probe

- Rinse only with **drinking water** — never with reverse-osmosis, distilled or deionised water, which attack the bulb. To dry it, dab it with soft paper, without rubbing the bulb.
- If you follow your aquarium's pH, calibrate the probe **every 3 months** with the wizard in section 12.3.

- Never let the probe dry out — more than 30 minutes in the air can damage it permanently.
- Replace it every **12 months**, or sooner if Probe Health falls below 55%.
- Always log the change under **Configuration → pH Probe → Log probe replacement**.

CHAPTER 26

Troubleshooting

26.1 KH readings fluctuating

This is the most reported symptom, and it almost always has one of these causes. Work through them in order:

#	Check	Action
1	Aeration in both chambers	Set the side valves for strong, equivalent airflow, with at least 5 mm of foam. If the air pump is weak, clean the air system or replace the pump
2	Probe age and health	Over 12 months in use, or Health below 55%, replace the probe
3	Chamber cleanliness	Empty, open the lid, clean, refill and recalibrate
4	Aquarium chemistry	Borate, phosphate, silicate or organic matter above normal affect the measurement
5	Stray voltage in the water	Check for current leaking from aquarium equipment
6	Lanthanum in use	Suspend measurements during treatment and for 6 to 12 hours afterwards
7	Hose position	Move it away from detritus, the skimmer and the dosing point
8	Still fluctuating	Contact support: we can assess the reading circuit's statistics remotely

26.2 Other symptoms

Symptom	Solution
Software updates do not complete	Format or replace the memory card
Graphs do not appear	Format or replace the memory card
System Status shows SD: Not Detected	Format or replace the memory card
Noise during aeration	Check the air pump's mounting — use silicone glue or double-sided tape

Symptom	Solution
Noise from the dosing pumps	Clean or replace the internal tubing
Traces of water in a dosing pump	Replace that pump's internal tubing immediately
Internal reservoir level low	Usually a consequence of power cuts during measurements. Empty completely, refill and recalibrate. If it persists, a level sensor may have a sealing fault — contact support
Equipment restarting on its own	Check the power supply and the memory card
Trouble reaching it through the cloud or app	Check Wi-Fi signal quality and internet access under **System → System Status → Network**
Dosed volume rising, with another replenishment system	Not a fault: your main system is not keeping up, and the doser is making up the shortfall. Check the reservoir, the reactor's CO2 and media, the tubing and the pumps, or increase its dosage (Chapter 16)
Doser on, but not dosing	Check whether the home screen shows **Calibrate** (calibrate the pump), whether the mL to raise 1.0 dKH field is filled in, whether the bottle has product, and whether measurements are taking place (Chapter 16)
CO2 Port always at 100% and KH falling	The reactor is not delivering: CO2 empty, media exhausted, valve blocked or too few bubbles (Chapter 17)
CO2 Port on in the app, but the solenoid or the pump does not run	The port does not supply power. Check that the input cable (IN and N) is plugged into the wall outlet or the power supply, and that the load is rated for the same voltage (Chapter 17)
Circuit breaker trips when the CO2 Port switches on	The power cable has one wire in IN and the other in OUT. Unplug it and move both wires to the bottom pair, IN and N (Chapter 17)

CHAPTER 27

Frequently asked questions

Do I need to calibrate the pH probe for the equipment to measure KH?

No. KH measurement works with the probe uncalibrated. Calibration is what lets the equipment display your aquarium's **real pH**. What matters for confidence in the measurement is **Probe Health** (Chapter 12).

How often should I compare against a chemical test?

Weekly for the first month, monthly after that. Remember that every kit has a margin of error, which varies with the manufacturer and the method — differences within that margin do not justify recalibrating.

Does measuring 24 times a day cost anything?

There is no reagent consumption and no cost per measurement. The only effect is normal wear on moving parts, which the maintenance routine in Chapter 25 already covers.

Does the Aquarino KH replace my balling or calcium reactor?

It can. If the Alkalinity Doser is your only replenishment, it replaces consumption hour by hour with your 3-in-1 or alkalinity product. If you have a calcium reactor or other dosing pumps, they keep doing the work, and the doser only tops up whatever is missing — or, with CO_2 Port control on, stays in reserve for the day the reactor fails (Chapter 16).

Can I use it on a freshwater aquarium?

The Aquarino KH is designed and calibrated for marine aquariums. Its measurement method starts from the properties of saltwater.

What happens if the internet goes down?

Nothing essential. The equipment keeps measuring, correcting and recording normally. While the internet is out you can still reach it at its IP address from any browser on your network (Chapter 8). When the connection returns, the history syncs.

And if the power fails?

It resumes on its own when power returns. If the cut caught a measurement halfway, that sample is discarded for safety. Frequent cuts lower the internal level over time — in that case, run a full calibration.

Can I have more than one Aquarino on the same account?

Yes. The app lists every piece of equipment you have access to, whether yours or shared with you.

Why does my KH vary through the day?

Because the aquarium's consumption varies: with the lights on, photosynthesis and calcification increase. A gentle daily variation is normal and healthy. What matters is the **trend across several days** — and that is exactly what the graph reveals.

I changed a setting. Do I need to restart?

No. Settings take effect at the next measurement. A restart is only needed after changing the Wi-Fi network.

CHAPTER 28

Specifications

Item	Specification
Application	Marine aquariums
Measured parameter	Alkalinity (KH)
Units	dKH, ppm $CaCO_3$, mEq/L
Method	Patented, no reagents
Measurement frequency	1 to 24 measurements per day
Cycle duration	Approximately 30 minutes
Upward correction	External dosing pump through the KH Buffer port
Downward correction	CO_2 solenoid or peristaltic pump control through the CO_2 Port
Maximum daily correction	From 0.15 to 1.00 dKH per day; 0.15 by default
Sensor	pH probe with BNC connector, 12-month nominal service life
Integration outputs	KH-OUT (BNC, emulates a pH interface) and Aquarino Controller integration
Connectivity	Wi-Fi 2.4 GHz (802.11 b/g/n)
Access interfaces	Aquarino app (Android and iOS) and a local browser interface on your own network
Notifications	E-mail, sound alert and indicator LED
Data logging	History and events on a memory card, with spreadsheet export
Updates	Over the network, with a notice in the interface
Power	Universal-voltage 12 V / 5 A supply (included)
Enclosure	Acrylic case

CHAPTER 29

Support and warranty

29.1 How to reach us

Whenever you need guidance or assistance, talk to us. We are here to help.

Channel	Address
E-mail	aquarinocontroller@gmail.com
WhatsApp — user group	https://chat.whatsapp.com/Hp9GjAmptpUEzbykjlUCMC
Website	https://www.aquarino.com.br/
YouTube	https://www.youtube.com/c/aquarino
Facebook	https://www.facebook.com/AquarinoController

> TIP
>
> **How to speed up your support case**
>
> Have the equipment's **UUID** (System screen) and its **firmware** version at hand;
>
> Describe what you observed and since when;
>
> If you can, send a capture of the **System Status** screen and a crop of the graph for that period.

29.2 Warranty

Aquarino warrants that the Aquarino KH has passed rigorous quality testing and carries a **1-year warranty** from the date of purchase, covering manufacturing defects and technical problems that compromise its proper operation.

Conditions

58 The warranty follows the product: if you sell it before the term ends, the new owner has the same rights.

59 The product must be used according to this manual and for its intended purpose.

60 The warranty does not cover damage from misuse, drops, accidents, improper installation, unauthorised modification, use of parts or accessories that are not recommended, or problems arising from inadequate power supply or voltage variation.

61 To claim the warranty, present the purchase invoice and describe the problem found.

62 Repair or replacement takes up to 30 days from delivery of the product to the authorised service centre.

63 If the product is under warranty and cannot be repaired, Aquarino reserves the right to replace it with a new one.

How to claim

Get in touch through any of the channels above, with your invoice at hand and a description of the problem. Our team will guide you through the next steps.

Thank you for choosing the Aquarino KH. Enjoy the hobby!