Mastertronic

User manual
English v 2.7

FOCUSTRONIC
SETTING NEW STANDARDS

Introduction 4

Basic Philosophy 4

Set-up-procedure 6

Placement 6

Connecting external hoses 6

Sample Water IN 6

RO Water IN 6

Waste Water OUT 6

Placement of Magnetic stirrer bars 6

Hardware preparations 7

Establishing software connection 7

Mount needles and syringe 8

Fill up the reagents 9

Calibrating 11

Stepper pump (Sample water pump) 11

Pump A (RO water pump) 11

Syringe 12

OLI calibrate 13

Test pump/syringe accuracy 13

Stepper pump (Sample water pump) 13

Pump A (RO water pump) 13

Syringe 14

Dashboard 14

Parameters menu 15

Maintenance functions 19

Empty Hoses and Chambers 19

Rinsing of Reaction Chamber 19

Descaling Program 19

Rinsing of Needle 19

Maintenance position 19

Standby position 20

Carousel Movement 20

Unlock Device 20

Syringe Empty 20

Empty Waste Container 20

Reset Pump Calibration 20

Leakage resolved 20

Maintenance 21

Change external hoses 21

Change hoses in pump 21
Recalibration 21
Descale/Clean the reaction chamber 21
Replace needle and syringe 22
Replace reagent vials 22
Frequently asked questions 23
Unit does not respond 23
LCD says that leakage has been detected 23
The waste hose is not fully emptied during calibration process 25
The results from Mastertronic are not the same as from my manual test or ICP test 25
I have to press on reagent brand name to see updated content in vial 25
The values, specially KH, Mg, Ca, are at the lowest or highest ranges all time. 26
Appendix 27
OLI 27
Summary of settings in assigned DT/ST/PT 27
Update Dosetronic to make it communicate with Mastertronic 27
Reagent info 28
Tank list/Device list 28
Contents in the Box 29
Specifications 30
Explanation of internal items 31

Product Registration – Warranty

Each unit of Mastertronic carries a limited factory warranty for 12 months upon registration. The online registration must be done within 14 days after purchase in order to be deemed valid. FOCUSTRONIC will also send updated information such as firmware updates or new features information via the registered email account. Product warranty is non transferrable. Please register via our website www.focustronic.net/product-registration .

Mastertronic may not be exposed directly to water and is not to be placed in humid conditions so that visible condensation is present in or on the machine. Failure to prevent the Mastertronic to humidity exposure may void the factory warranty.

Safety information

Be careful when handling Mastertronic and keep hands out from the needles and moving parts. Also follow the safety information from the manufacturers of the reagents. Focustronic has no responsibility of any kind of injury or damage related to above mentioned items. Use "Maintenance position" of the needle when doing certain maintenance.

Introduction

Congratulations for choosing this highly advanced device, measuring nitrate, phosphate, calcium, magnesium, alkalinity and OLI, and also has an inbuilt possibility for measuring even more elements in the future.

Please read the whole manual very carefully before setting up and using the device.

Basic Philosophy

Mastertronic is a standalone machine, that together with the appropriate reagents , will completely and automatically measure and record the values of nitrate, nitrite, phosphate, calcium, magnesium, KH and OLI. It also has the inbuilt capacity from the beginning, to further increase the measuring palette for the future.

Next important after KH are the nutrients Nitrate and Phosphate. Nitrate and phosphate are very crucial for the corals health as it´s the nutrient for the zooxanthellae, that in turn gives coral their energy. The acceptable windows for what is optimal for the coral is quite small, as these elements at the natural reef are both very stable, and also normally quite low. In a tank, we have a closed system, which struggles to mimic the nature. It doesn't require much at all to double or halve the nutrients just over a few days, and that will have a great impact on the corals. In most cases it´s bad for the coral with these rapid changes, but the value itself is also so crucial. So for the first time, there is a machine, Mastertronic, that takes care of these crucial parameters for you and therefore raises the level of reefing to an outstanding level!

We also added the Calcium and Magnesium measuring possibilities. Normally Ca and Mg follow the alkalinity consumption, as it takes the same amount of calcium molecules to form the skeleton as it takes the amount of carbonates (KH). So, as long as you dose carbonates and Calcium in a ratio of 1:1 then the Ca value will follow the dKH. Therefore Calcium is not necessarily needed to measure that often. And up to the present date, almost all modern dosing recipes are balanced in this way. **But** with that said, alkalinity is involved in bacterial processes, where for instance nitrification consumes alkalinity and denitrification does the opposite. In normal cases this has a quite small impact, but in some cases in long term, the alkalinity and Ca can drift apart, despite you dosing in a balanced way. Secondly, your recipe may not be perfectly balanced after all. Therefore we actually also recommend to measure calcium from time to time. So therefore we have added both Ca and Mg in Mastertronic, to get this measuring palette complete for you.

Our Alkatronic is superior to measure the alkalinity. But despite that we have chosen to include a KH measuring function also in Mastertronic, to make it totally complete for all customers. Its very important to understand here the difference between a high-end ph electrode based dKH value, like we do in Alkatronic, and a colorimetric

method based on color change. The ph electrode based test (like in Alkatronic) is the only way to get that high-end reading that Alkatronic has, and that you need to also get the regulatory features. So the KH part in Mastertronic is a service to make Mastertronic 100% complete and superior, but should never be instead of a pH electrode based KH test (Alkatronic).

Congratulations on your choice of Mastertronic, fulfilling a keystone to bring coral reefing to a higher level than ever before!

/Focustronic

Set-up-procedure

When setting up this device for first time, follow every point below very carefully. Also refer to the last page with an overall picture of all the internal items.

Placement

Make sure you place the Mastertronic in a location that allows you to easily manage regular maintenance. Also make sure its not exposed directly to water and not to be placed in a humid area so that visible condensation is present in or on the machine.

The machine must also be placed in an absolutely horizontal position.

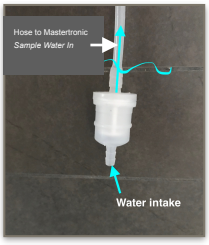
Connecting external hoses

!!

There are 3 hoses and hose connections in Mastertronic**. Original hose length for each hose is 2.0 m. It's very important that you never change these hose lengths. It is also very important that you never use a hose of any other inner diameter than the original, 3.2mm, so when you replace these hoses use the same length and diameter as the original.**

Sample Water IN

Use the included hose labeled (1) and on one end attach the microfilter (see picture) and make sure that is always fully submerged in the tank water.



RO Water IN

Use the included hose labeled (2) and place that in a container containing RO water. Make sure the hose is always below the water surface. We suggest using at least a 5 litre bucket.

Waste Water OUT

Use the included hose labeled (3) and place that in a container that will receive the waste water. We suggest using at least a 5 litre bucket.

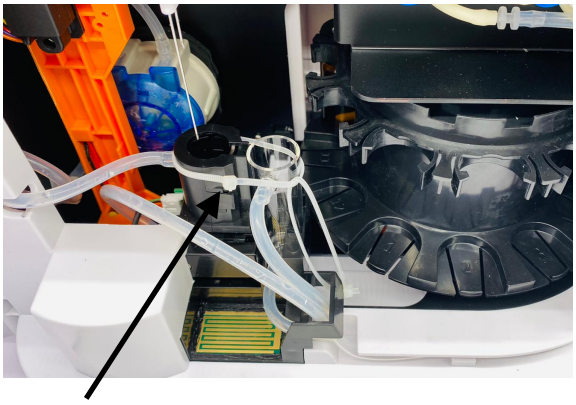
Placement of Magnetic stirrer bars

All the reagent vials come with a magnetic bar pre installed with the exception of the reaction chamber (the black chamber to the left).
Included in the package are two extra bars, **please put the smallest one (10x5mm) in the reaction chamber (the black chamber to the left)** and the larger one (15x5

mm) is a spare for the reagent vials. Please note: The rinsing chamber does not require one.

Hardware preparations

- Remove (cut off) the zip ties around the chambers. Be very careful not to damage the hoses or nozzles! Also after that remove the transport/lock screw (see pic).



Transport zip ties. Cut off carefully.

Transport/lock-screw. Remove BEFORE first power on!!

Establishing software connection

The next step is to establish a connection between the App on the phone/tablet and the machine. The app is running on the internet/wifi.

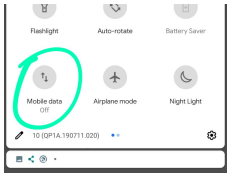
Do NOT power on the unit yet!

If this is your first Focustronic product and have no account yet, start with step I-III (users with existing accounts can start from point 1):

I. Download the Focustronic All in One app from Google Play or App Store.
II. Open the app, and create an account.

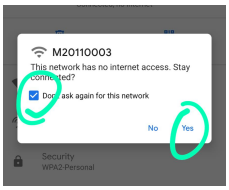
Now proceed with the following steps:

1. **Do not power on the unit yet**!
2. **Remove the transport/lock screw** if you haven´t done that yet.
3. Power on the Mastertronic
4. If you have Android now turn off 4G/ mobile data on the phone.
5. Open wifi settings on your phone/tablet and wait for wifi

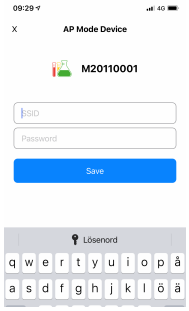


to find Mastertronic

6. Mastertronic will show up in ”other networks” with its serial number ”*Mxxxxxxxx”*
7. Connect to Mastertronic’s WIFI (Mxxxxxxxx) and use the password: ***mtpassword.***
8. <u>If you have Android</u> it may ask you if you want to stay connected despite no internet access. Press *Yes* in that case.



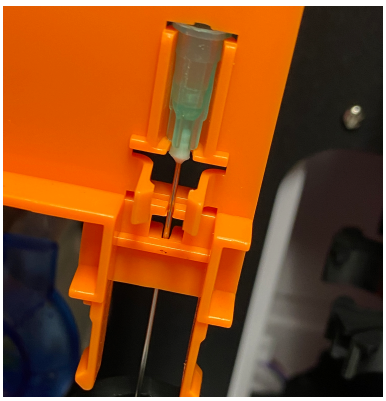
9. Open the App, log in.
10. Now its asking you to connect to your home router
11. Enter your router's SSID and Password (MT will use the 2.4GHZ channel. For SSID name use no symbols).



12. Your Mastertronic is now connected to your router, and therefore also now online.
13. Watch the LCD screen. If it does not display the latest software, it will now automatically download that. As long as the machine is online, all the new updates will be automatically received and installed.
14. If Mastertronic is not online, check in the router settings if it is blocked by a firewall.
15. In the app now choose Mastertronic, ‘Maintenance’ and press ‘Unlock' to once and for all unlock the unit from factory. After the unlock, the unit will perform an initialisation process of the needles x and y axis and the carousel.

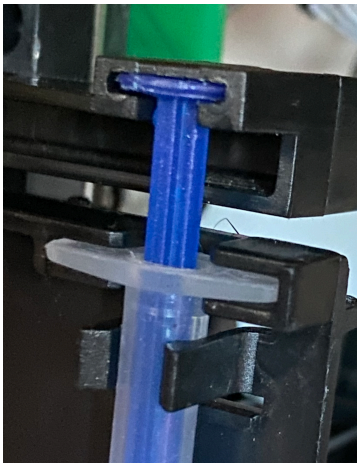
Mount needles and syringe

1. Mount the vent needle. Make sure needle goes through the hole, see pic.



2. Mount needle on the syringe. Do not apply too much force.

3. Put needle through the needle stabilisator (the white plastic part) and mount needle and stabilisator into it fittings according to the pics.

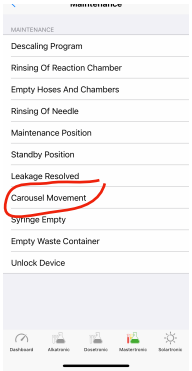


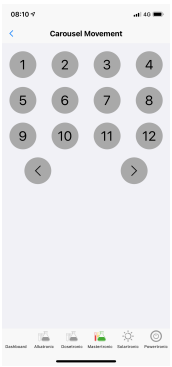
Now you can proceed with calibration and fill up reagents.

Fill up the reagents

Mastertronic uses the high end reagents that exist on the market, and we have tested and chosen those that are best for this purpose. Mastertronic, thanks to our underlying own algoritms for the photometric analysis, will not mimic the accuracy of the corresponding manual test for the reagent, but have its own higher accuracy, precision and resolution according to our specifications (see specifications).

When filling the reagent vials there are a few important things to bare in mind:





- When you assign a reagent vial to the carousel it will automatically move to the correct position**.** Its also possible to control the carousel from the app (see picture**). NEVER move the carousel with your hands! That will destroy the machine!**

- Always shake the original reagent bottle before emptying it into the Mastertronic vials**. For *"reagent B" in Fauna Marin Nitrate*, and "R*eagent 2" for API-Ca*, shake vigorously at least 30 seconds before emptying it into the MT vials.**

- To make it easier empty all the solution from the reagents original bottle, usually you can remove the plastic tip from the reagent bottle (after you have shaken it) with a pair of pliers if needed.

- Make sure all the reagents are up to date, and try to fill the Mastertronic vials almost to the top line, **and be prepared to refill when its around 8 ml of reagent left to make sure its totally safe and the needle is always is below the surface. Of course MT alerts you of this in time.**

- Make sure you reset the refill counter to get the correct alerts, and a **100% filled vial = 20 ml.**

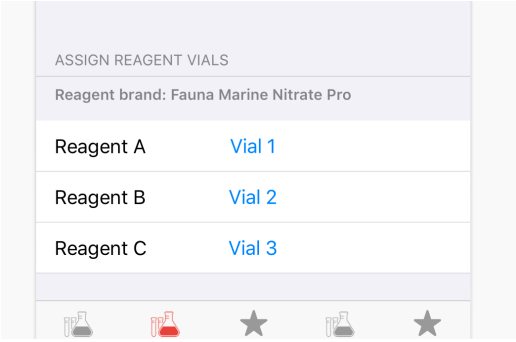
- Never fill above the line, see picture.

- Once you have chosen ”Vial X” for ”Reagent Y”, **then always keep to that**, to avoid the risk of contamination. Mastertronic has enough vials in the carousel to test **all** the parameters at the same time.

- When its time to refill, take as a good routine to from time to time rinse out the vial with RO water before you refill it. Its very important this RO water is really true RO water, if you doubt that better to buy some distilled water for this purpose.

Assign the reagents for a parameter:

1) Open the Focustronic app and choose Mastertronic in the device list from the Dashboard
2) Choose the parameter, and choose ***Assign reagent vials.*** Choose your brand of reagent refill.
3) In the app input which reagent (A,B,C, 1,2,3) is in which vial (1-12), and also add any refilled volume (a full vial = 20 ml)
4) Save



Note: The Mastertronic reagent labels (A,B,C,1,2,3) are the same as the manual test kit labels.
Note: The parameter needs at least one scheduled measure to show the assigned reagents and its remain volume automatically.

Repeat the procedure for each parameter.

Table : This shows which reagent brand you shall use for each parameter. In some parameters there are more than one alternative that will work fine, but if possible to choose then we recommend first option with an *. This list can possibly be extended in the future.

	Nitrate	Nitrite	Phosphate	Magnesium	Calcium	KH
Brand	***Fauna Marin** (*Reagent A,B,C*) **Tropic Marin PRO** (*Reagent A,B,C*)	***Fauna Marin** (*Reagent A,C*) **Tropic Marin PRO** (*Reagent A,C*)	**Red Sea Phosphate PRO** (Reagent A,B)	**Red Sea Magnesium PRO** *(Reagent A,B,C)* **Red Sea Magnesium** *(Reagent A,B,C)*	**API** (*Reagent 1,2*)	**Salifert** (Reagent *"KH-Ind"*, *"KH reagent")*

Note: It's actually possible to assign more vials to the same parameter, and in that way increase the number of tests before needing to refill.

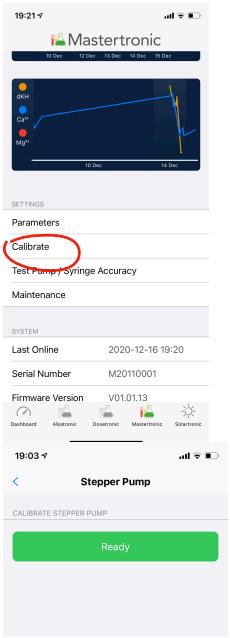
Note: For Nitrite, you don´t have to assign any other reagents, Mastertronic uses same reagents for nitrite as you have assigned for nitrate.

Example:
If you for instance load vial 1-3 with Fauna Marin reagent A-C for nitrate, you can load also vial 10-12 with the same reagents. Mastertronic will start to use vials 1-3, and when they are empty, automatically switch over to vial 10-12.

Calibrating

Tip: Disable screensaver in phone/tablet when calibrating.

Mastertronic has 2 pumps and one syringe that need to be calibrated.

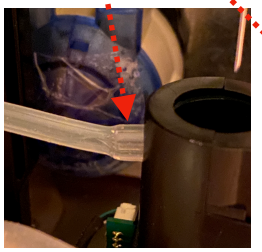


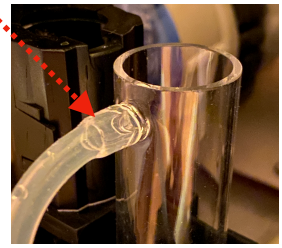
Stepper pump (Sample water pump)

Pump A (RO water pump)

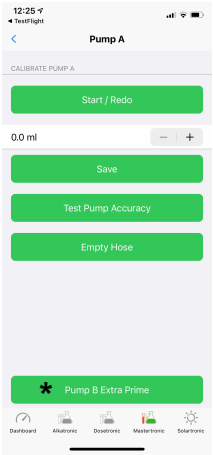
1) Open the Mastertronic app, and enter calibrate, and choose '*Stepper'* or *'Pump A'*
2) Press "*Ready*". Now machine will perform a procedure and **just wait until the machine completely has stopped**.

3) Now carefully check the feeding hoses (see pic) to the chamber are fully primed. It should be, but during certain circumstances it may not be, and in that case you have to repeat the step 4-6 below a few times. **If you repeat the step 4-6 to get fully primed, do not forget to have the collecting measure cylinder totally empty when you press ”start/ redo” the last time. Thus never use the first output of water if it was not fully primed. Only use the volume after a redo and when the hose is already fully primed at the edge of the chambers.**





4) Now press ”*Start/Redo*”. A popup window will now ask you to put the waste hose into the included measuring cylinder. Then press ”*Calibrate*”. **A series of pump actions will start and do NOT press any other buttons until all pumps have stopped!**
5) Water has now been delivered in the measuring cylinder**.**
6) Read water amount in the cylinder. Enter in the app with one decimal point (x.x), and press ”*Save*”.
7) Now its actually possible to redo the calibration if you are uncertain it was done correctly, just press ”Start”Redo” and follow the instructions again from step 4.
8) Now when calibration is finished its advisable to press ”test pump accuracy” to confirm you have a perfectly calibrated pump. If you do that it’s the same as above, just collect the water that is coming out from the waste hose and it should be 7.0 ml if the pumps are perfectly calibrated.



9) When you are done, finish the session by press ”*Empty Hose*”. **The app will not allow you to leave the page before you press this for security reasons. But if the app, for any unpredictable reason, doesn’t prompt you to ‘empty hose’, always do that immediately through the maintenance page!**
10) Don't forget to put waste hose back into the container where you collect the waste water!

*This extra button is normally not to be used. Read more in FAQ.

Syringe

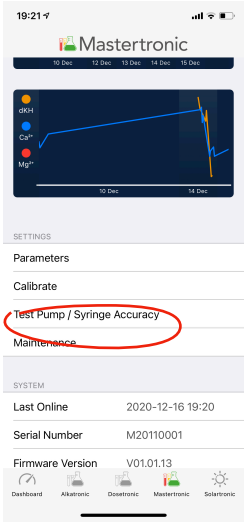
1) Open the Mastertronic app, and enter “calibrate", and choose “*Syringe”*
2) Press ”*Ready*”.
3) Now press ”*Start/Redo*” and the syringe will move to a certain position.
4) Read the syringe very carefully (note that every line corresponds to 0.02ml), and enter the value (for instance 0.64 ml) in the app and save.

5) Now its actually possible to redo the calibration if you are uncertain you read the syringe perfectly, just press ”Start” then “Redo” and take a new reading then save.
6) Now its calibrated and if it its perfectly calibrated it should go to exactly 0.60 ml when you check test it with ”test syringe”.

OLI calibrate

Mastertronic has the possibility to measure the yellow discolouration of the water, which is a very good indicator of the overall organic load and decomposition levels. With this parameter you have a very good idea of when to replace any carbon media or make other actions to reduce the build up of organics.

1) Add around 10 ml of RO or distilled water into the reaction chamber. Be careful not spill water outside.
2) Open the app, and enter “calibrate”, and choose ”OLI” and Press ”calibrate”.
3) The machine will now start to calibrate automatically and after that it will empty the reaction chamber automatically.



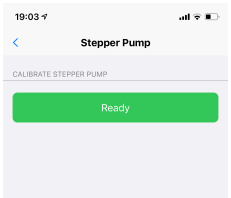
Test pump/syringe accuracy

Tip: Disable screensaver in phone/tablet.

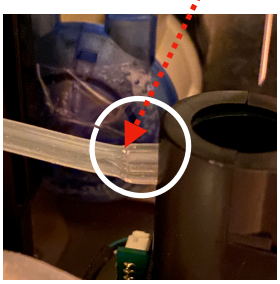
If for some reason you want to check the calibration status/ accuracy of the pumps or syringe, please use this function.

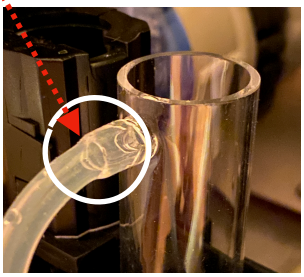
Stepper pump (Sample water pump)

Pump A (RO water pump)



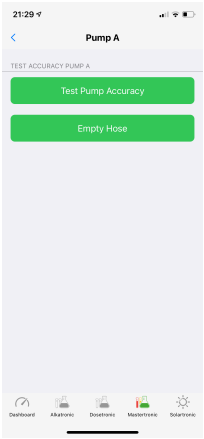
1) Open the Mastertronic app, and enter “*Test Pump/Syringe Accuracy”*, and choose “*Stepper”* or *“Pump A”*
2) Press ”*Ready*”. Now the machine will perform a procedure and **just wait until the machine has completely stopped**. **Pay attention that the feeding hose is fully primed! If NOT, then perform step 3-5 below a few times before take the final reading!!**
3) Now press ”*Test Pump Accuracy ”.* A popup window will now ask you to put the waste hose into the included measuring cylinder. Then press ”*Test Pump*”.
4) Water will now be delivered in





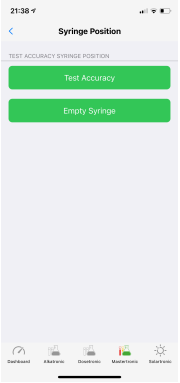
the measuring cylinder, **keep the hose in place until the pump has stopped.**

5) Read the water content in the measuring cylinder. A perfectly calibrated pump will give **7.0 ml**.
6) Now its actually possible to redo the test if you are uncertain you measured or read incorrectly, just press ”Test Pump Accuracy” again and follow instructions again from step 3.
7) When you are done, finish the session by pressing ”*Empty Hose*”. **The app will not allow you to leave the page before you press this of security reason. But if the app, of any unpredictable reason, not force you to empty hose, always do that immediately through the maintenance page!**
8) Don't forget to put waste hose back into the container where you collect the waste water.



Syringe

1) Open the Mastertronic app, and enter *Test Pump/Syringe Accuracy*, and choose *Syringe*
2) Press ”*Ready*”.
3) Now press ”*Test Accuracy*” and the syringe will move to a certain position.
4) Read the syringe very carefully and if perfectly calibrated it will stop at 0.60 ml.
5) End by pressing ”Empty Syringe”

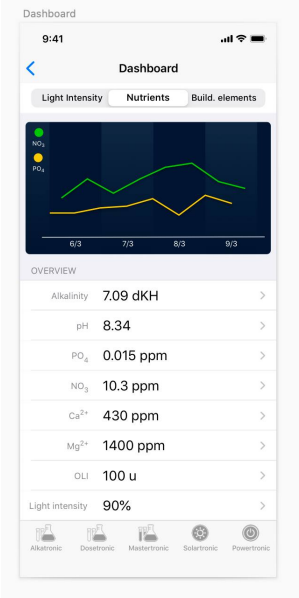


Dashboard

The Dashboard is the Home Screen in the Focustronic app. Here you will get an overview in graphical form of all the parameters. By choosing one of the headline buttons “Nutrients” , “Build elements” you will see summarising graphs concerning all the parameters your Focustronic system has measured.

In same page you also always see the values of the latest measurements concerning all parameters your device/s has measured.

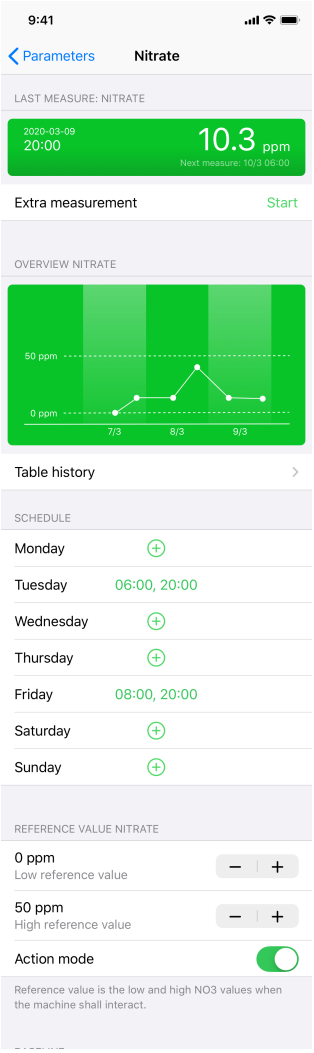
At the bottom of the Dashboard you see the device list, where you access all the units in more detail.



Parameters menu

You have now chosen the Mastertronic from the device list from the Dashboard. Then you are directed to a main menu that concerns general settings like calibration and maintenance. From this menu you now click on ”parameters”, and choose one desired parameter to set up, hereby entering the heart of the app, **the parameters menu.**

There is one parameter menu for each parameter, so all settings here are only valid for the chosen parameter.



Graph/Latest measurement/Table history

At the top of this menu you see the results in a graphic form, latest measured value, time for upcoming next test, and its also possible to open a table/history to see the details.

Extra measurement

When clicking on this you start an extra measurement of the chosen parameter, outside the scheduled ones.

Schedule

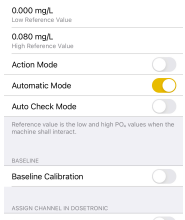
Here you customise the schedule when you want this parameter to be measured.

Action Mode

If you own one of our power sockets or a Dosetronic, you can let these units do actions based on the measurements from Mastertronic. If you want these interactions then set action mode to ON, and set the reference values. Mastertronic will now interact with Dosetronic/PowerTronic by changing an assigned channel (see below) or open/close an assigned socket, when the values of the parameter are outside the reference values.

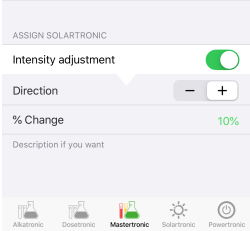
Automatic Mode

After Mastertronic has performed an alteration of the assigned channel/s in Dosetronic, its going to set back to *Action Mode* OFF and will remain OFF until you manually reactivate it. But if you also



have the "*Automatic Mode*" enabled, the A*ction Mode* will automatically set back to ON after 4 days after an action. This is due to some parameters taking a few days to react to any changes made, and won't allow the Mastertronic to keep correcting corrections

Assign Solartronic *(Coming soon)*



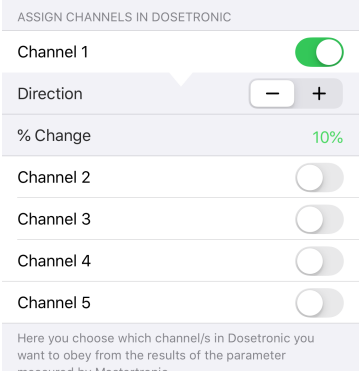
Here you assign the Solartronic to obey from the results of the parameter measured by Mastertronic. Typically its the nutrients parameter you assign to your Solartronic. The %-change button is how much the overall light intensity shall be changed if the assigned parameter (typical NO_3, PO_4) is outside the reference values. + *(plus)-Direction* means that if the parameter is above *high ref value* it will increase light intensity, and if below *low ref value* it decreases light intensity. - *(minus) direction* acts in the opposite way.

Assign sockets in PowerTronic*(Coming soon)*

Here you choose which socket/s you want to obey under the results of the parameter measured by Mastertronic.

Assign channels in Dosetronic

Needs a DT sw gen 2.5, see here.



Here you choose which channel/s in Dosetronic you want to obey from the results of the parameter measured by Mastertronic.

Direction Mode

Minus (-) direction Mode

A value above *high ref value*, will lead to a decrease of the dosing schedule in the assigned Dosetronic channel. And if a power socket is assigned, a closure of that socket.

A value below *low ref value*, will lead to an increase of the dosing schedule in the assigned Dosetronic-channel. And if a power socket is assigned, an opening of that socket.

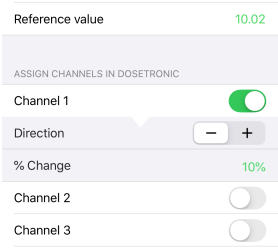
Plus (+) direction Mode

A value above *high ref value*, will lead to an increase of the dosing schedule in the assigned Dosetronic-channel. And if a power socket is assigned, an opening of that socket.

A value below *low ref value*, will lead to a decrease of the dosing schedule in the assigned Dosetronic-channel. And if a power socket is assigned, a closure of that socket.

%-Change

If Mastertronic, according to the logics above, will make any changes to the assigned Dosetronic channel, it will alter the whole channel in terms of %. 10% change is default but can be customised here. When coming to nutrient additions like nitrate dosing, carbon source dosing, Ca values, the parameters that Mastertronic can both measure and conduct, all those factors and parameters are slow reacting and sometimes also unpredictable, therefore giving a fixed % change the best option.



Important:

After Mastertronic has performed its alteration of the assigned channel/s in Dosetronic, Mastertronic is <u>going to set back to *Action Mode* off, to let the system stabilize and avoid an action upon an action.</u> But If you also have the "*Automatic Mode*" enabled, the A*ction Mode* will automatically set back to ON after 4 days. If "*Automatic Mode*" is disabled, the *Action Mode* must always manually be reactivated.

Ex: You are in the parameters menu for Nitrate. Action Mode ON, and Automatic Mode ON. You assign Dosetronic channel 1, Minus Direction Mode (default) , and Dosetronic channel 2, Plus Direction Mode. You assign socket 1, Plus Direction Mode. In channel 1 you dose Nitrate. In channel 2 you dose organic carbon. The socket 1 is connected to a biopellets reactor.

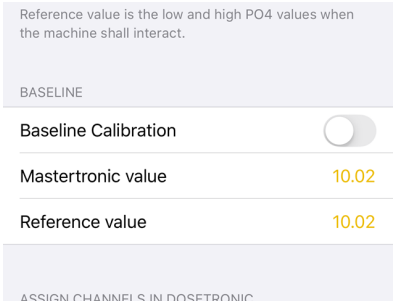
Now Mastertronic will do a nitrate measure and we assume its above your ref value. This will now happen: In channel 1 in Dosetronic the nitrate schedule will be overall decreased by 10%, as a single action. In channel 2 in Dosetronic the organic carbon schedule will be increased by 10%, as a single action. The socket 1 in powertronic will open (or keep its open status). Action Mode will after that go OFF, and after 4 days automatically goes ON again.

For the assigned Powertronic sockets, *Action Mode* will keep its status until you change it.

Assign Reagent Vials

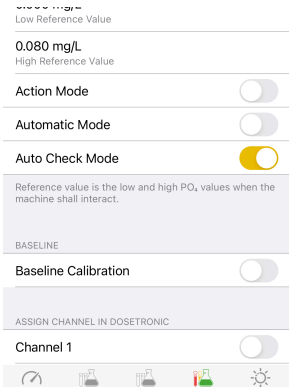
see "<u>Fill up reagents</u>"

Baseline Calibration



All parameters have their own baseline calibration, found in the parameters menu. Normally this function is not used, and the default is therefore a disabled status. But if you for any reason find some deviations, and are 100% sure of the true value, you can compensate for this by using the *Baseline Calibration*. If you use this function , enter the reference value in ”*Ref value*” and the machine value in ”*Mastertronic value*”. Of course both samples must have been taken at the exact same time, and on same location from the tank, and the reference value should be proved to be accurate (see this section)

Auto Check Mode



If this mode is enabled, Mastertronic will redo the measurement **once** if it´s outside the settled reference values, and settle the second measurement. This is a safety feature to validate that a value is really correct before it leads to any actions.

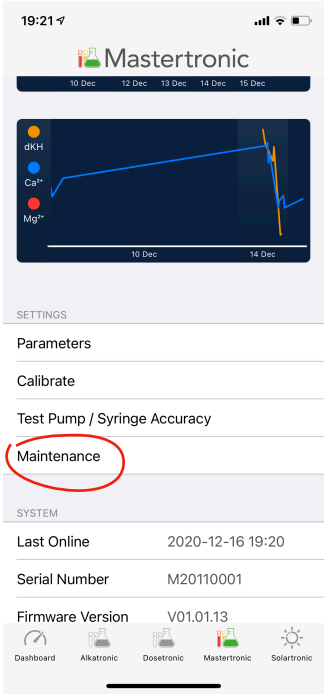
Nitrite Correction Mode *(Coming soon)*

Nitrate tests work in that way it´s converting a portion of the nitrate (NO_3) in the sample to nitrite (NO_2), and then actually measures nitrite. So theoretically if you have a significant amount of nitrite in the tank water, that could lead to a slightly false high measurement of nitrate. **In the majority of situations the nitrite is of very low concentration (< 0.02 mg/l), so this is negligible** and thus does **not** have this effect on the final nitrate value.

But in some **special situations** like an immature tank with slow nitrification process (nitrite values >0.02 mg/l) you have the option to set the machine in Nitrite C*orrection Mode*, and then a nitrate test will be proceeded automatically by a nitrit test and then Mastertronic do the compensation math, and always give you the true nitrate value even if there has been some nitrite in the water. Mastertronic uses same reagent/s for NO_2, as for NO_3 measurement, so you **don´t have to assign any new reagents.** As long as you have reagents for NO_3 measurements you also have it for NO_2 measurements.

Maintenance functions

These functions you find under "*Maintenance*", and most of them you don't use regularly.



Empty Hoses and Chambers

Normally you will never use this function as Mastertronic takes care of all priming and emptying procedures, also when calibrating. But in the case of an unpredictable error you can always manually empty these by using this function.

Our second safety-belt is a leakage sensor below the chambers, that will in a case of an unexpected overfill situation, lock down the machine. See also this section.

Rinsing of Reaction Chamber

In all normal usage situations rinsing and emptying is of course completely automatic.
So this function is typically only used when you have manually cleaned the Reaction Chamber with a Q-tip/cotton bud and have to finish that with a rinsing program. See Cleaning

Descaling Program

This function is used when you want to descale the reaction chamber. See Descaling.

Rinsing of Needle

In all normal usage situations rinsing of the needle is of course completely automatic. So this function is typically only used if something unpredictable happens and you want an extra rinse of the needle.

Maintenance position

Maintenance position is used when you change the hose of the stepper pump, or clean the chamber.

Standby position

Standby position is ideally never used, as all algorithms and failsafes always make sure the needle is in the correct position. So this function is just to take the needle to the highest position above the reaction chamber in case of any unpredicted errors

Carousel Movement

With this function you move the carousel to desired position to take out or reinsert a reagent vial. **Never rotate the carousel by hand**

Unlock Device

After you have started a brand new machine for very first time from the factory you need to press this button.

Syringe Empty

This button is ideally never used, as all algorithms and failsafes always make sure the syringe is empty. So this function is if something unpredictable happens and will take the syringe to the bottom position.

Empty Waste Container

This resets the counter for the waste container.

Reset Pump Calibration

This function is normally not to be used, as the machine comes from the factory with a factory calibration, and after that users do their own calibration. But if you for some reason, mostly after contact with tech support, need to reset calibration data back to factory values, you can use this button. **After a reset like this, you must proceed to calibrate the pumps.**

Leakage resolved

If a leakage occurs, Mastertronic will stop and display a leak error message on the LCD. When you have dried up the water carefully, press “Leakage resolved”, and Mastertronic will resume (if there is absolutely no water or humid residuals on the leakage sensor) and go back to a ready-to-use status. If the leakage occurred during a test cycle, after pressing “Leakage resolved” Mastertronic will immediately be followed by an automatic empty procedure, and then also a rinsing procedure.

Maintenance

Change external hoses

We recommend to change the external hoses every 8 months, **and it very important to use exact the same Inner Diameter as original (3.2mm) and same length as we provide from start, 2 m for all the external hoses. NEVER change the length nor the diameter of the external hoses!**

Change hoses in pump

We recommend to change the hose in the stepper every 8 months, and the hoses in pump A,B,C every 12 months. Put the needle in ”maintenance position” , when changing the stepper hose, and in ”standby position” when changing hoses in pump A-C. For tips on how to change the hoses check out www.Focustronic.net for a video.

Recalibration

Calibration is to be done around 8 weeks. The machine will give you an alert when its time to calibrate, as a reminder.

Descale/Clean the reaction chamber

Due to the reagents containing colour dyes and also carbonate deposits, its advisable to make regular cleaning and descaling of the reaction chamber. The interval depends on the measure frequency, but around every 4 weeks is a good rule to keep consistent results every time.

Descaling

- Make sure the machine is in standby mode and the reagent chamber and hoses are empty. **Normally** its totally emptied as all test cycles end with an empty phase and also after a restart Mastertronic starts with an empty program. **But** If there is, for some unpredictable reason, despite this water in hoses and/or chambers, press ”*Empty Chambers and Hoses*” from the app menu.
- Open the app and press ”*Descaling Program*”
- In LCD now you see a message prompt you to manually fill the reaction chamber with 11 ml of rinsing solution. Be careful to not spill any water outside the chamber! **The rinsing solution shall be the same as you use for cleaning pH-probes, a 0.1M HCL solution**. You can find that in all aquarium retailer stores.

- Machine will now automatically set a timer for 25 min
- After 25 mins the machine will automatically empty and finish the descaling.

Cleaning

- Make sure the needle is in maintenance position and reagent chamber and hoses are empty. **Normally** its totally emptied as all test cycles end with an empty phase and also after a restart Mastertronic starts with an empty program. **But** If there is, for some unpredictable reason, some water in the hoses and/or chambers, press ”*Empty Chambers and Hoses*” from the app menu.
- Use a Q-tip/cotton bud and soak that with ethanol (its ok to use for instance non gel based hand-alcohol of different kinds). Rotate gently the Q-tip/cotton bud against the inside of the reaction chamber a few times.
- Open the app and press ”Rinsing Reaction Chamber” and machine will automatically finish the cleaning program.

Replace needle and syringe

Replace both the needles (sample needle and vent needle) and syringe every 4 weeks. **When press needle on the syringe do NOT apply too much force.**

Replace reagent vials

Depending on which reagent this interval may vary quite a lot, and is different between the vials. As a rule of thumb replace a reagent vial every 6-8 months. The best way to judge is to look at the rubber membrane and if that shows sign of ageing, cracking or very dry then its time for a new vial.

Frequently asked questions

Unit does not respond

Check if the unit is online. If not, then check the router handles 2.4 GHZ, and if a firewall in the router is blocking the communication.

LCD says that leakage has been detected

Mastertronic has an inbuilt leakage sensor for security reasons. If something unexpected happens and leakage occurs, the machine will stop immediately and you shall receive a notification. You will have to dry the machine, and then press ”Leakage resolved ” and Mastertronic will resume.

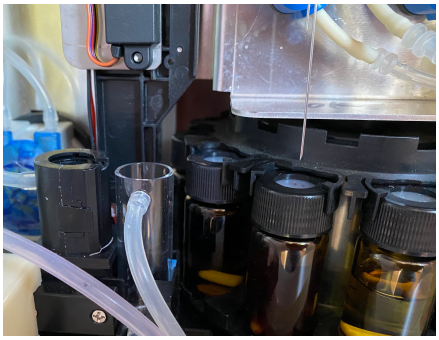
For drying properly do this:

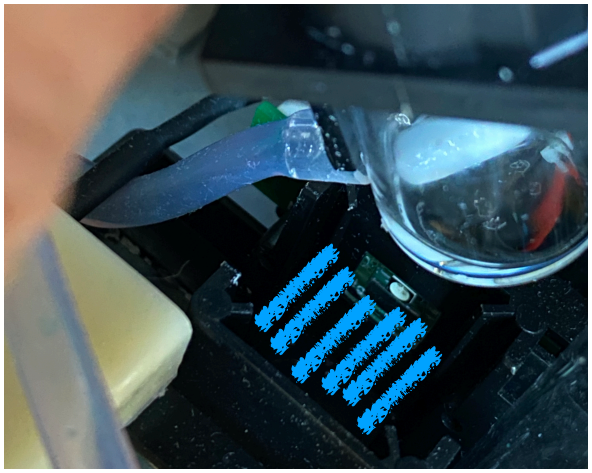
1) Dry up the visible water that is on the leakage sensor.

2) Press ”*Leakage Resolved*” and if sensor is dry, it will resume.

3) Go to *Maintenance* and press *Maintenance Position* , and needle will move to the right.

4) Carefully lift up the reaction chamber and also rinsing chamber and dry up residual water in this area.



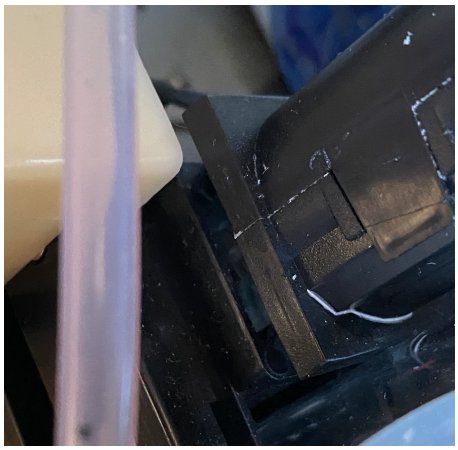


5) Refit chambers, go to maintenance and press ”*Standby Position*” to let needle go back to standby position.

6) Now, use Mastertronic as usual and it should work correct.

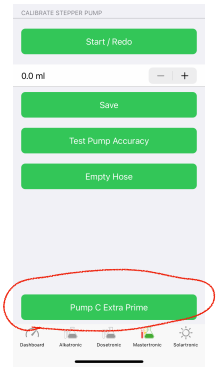
IF you despite actions above experience that Mastertronic is measuring obviously wrong (Like always very very low values), then sensor may need to be dried some more and then proceed with the additional steps below:

A. Power off unit
B. Lift up the chambers leaving a small gap, for further air drying for 1-2 days.



C. After 1-2 days refit the chambers to its original position, so there is no visible gap and power on machine.

The waste hose is not fully emptied during calibration process



During the calibration process the last step is emptying pump/s B and C by delivering the water to your collecting cylinder via the waste hose. These pumps runs with huge margins, so in normal case this is 100% automatic. But if the waste hose for some unpredictable reason is not fully emptied, then press “Pump C extra prime” a few times before you read the measuring cylinder.

The results from Mastertronic are not the same as from my manual test or ICP test

If Mastertronic is correctly calibrated by the user and you use up to date reagents, the accuracy is as stated below.

If you want to double check a result, which is always a good practice from time to time, you can do it in this way:
Use a manual hobby test kit, not out of date. Do a measurement with this test kit on a reference fluid (ATI has one for instance), and calculate a correction factor. Now do a test with the manual test kit also on your tank and correct the measured value with the factor. Now this value is very likely to be the true value. This value should be close to a fresh Mastertronic measurement, within its stated accuracy.

Concerning ICP and PO_4 its also worth to take note: ICP measures all phosphorus, not just the inorganic PO_4. That means that if the sample to the ICP contains some organics, ICP may give you a false high value of PO_4, as ICP just measures the P atoms, and does not take into account where this P atom is coming from. This P value is then assumed by the ICP algorithm to have its origin come 100% from PO_4, which is not fully the truth. So for that reason, it´s not always fully correct to compare an ICP based ”PO_4” with a measured one. The ICP can, due to the reasons above, sometimes give false high results for PO_4.

I have to press on reagent brand name to see updated content in vial

This is because you haven't set a schedule. Just make a schedule in the week calendar, and the information of reagent content is automatically updated when open the parameters page.

The values, specially KH, Mg, Ca, are at the lowest or highest ranges all time.

As long as MT is correct calibrated, it has its accuracy and precision specified below.

But if you notice that the values are always very close at the max or min limits, then it could be something wrong.

Mg^{2+}	790 - 1580 mg/l
Ca^{2+}	303 - 561 mg/l
KH	6.08 - 12.16 dKH

Then go through this check list:

- Syringe correct calibrated? Test with ”test syringe” and it should be 0.6 ml.
- Stepper pump correct calibrated? Test pump and it shall be 7.0 ml. Also note that when you calibrate and/or test, you may have to redo a few times to be sure hose is fully primed. See section in this manual about calibration.
- Hoses that take RO water and/or sample water has float up?
- Is there RO water enough in the RO container?
- Is reagent less than 8 ml in the reagent vials? (Then needle will not get any fluid).
- Have you had a leakage last day/s? Then light sensor might have been humid and need drying. Do a light sensor test (maintenance section) and you should get values back around 1500-3000. If not (like 0-100 values) , dry the sensor according to instructions here.
- Have you forgot to place the magnetic bar in the reaction chamber?
- Is the needle broken?
- Have you mounted the second ventilation needle?

Appendix

OLI

OLI is our own parameter designed by Focustronic, and has a range between 0-200 Units. It measures the yellow discolouration of water, but also other colours as a sign of organic waste substances in the water. Until now it has been a total guessing game when the time to change the activated carbon, or increase/decrease the ozone to get rid of the waste substances from the organic load. 0-value means a water with no signs of colour at all. Its not possible to say what sort of value is optimal, so see this function as more like a barometer that tells you when something has changed, and its time to take some action (like change the activated carbon etc). You calibrate the OLI against some RO/Distilled water (see calibrate section) **We recommend to recalibrate OLI every 4 weeks**.

Summary of settings in assigned DT/ST/PT

	Dosetronic	Powertronic	Solartronic
+ Direction Mode	High value=Increase dose Low value=decrease dose	High value=open socket Low value/normal value=close socket	High value=Increase light intensity Low value=decrease light intensity
- Direction Mode	High value=Decrease dose Low value=Increase dose	High value=Close socket Low value/normal value=Open socket	High value=decrease light intensity Low value=increase light intensity

Default

Update Dosetronic to make it communicate with Mastertronic

To get the regulatory functions between Mastertronic and Dosetronic , you have to run a Dosetronic unit with software version V02.05.07 or later. ALL DT-units are easy to upgrade by yourself , and Focustronic will send out separate instructions how to do that.

Reagent info

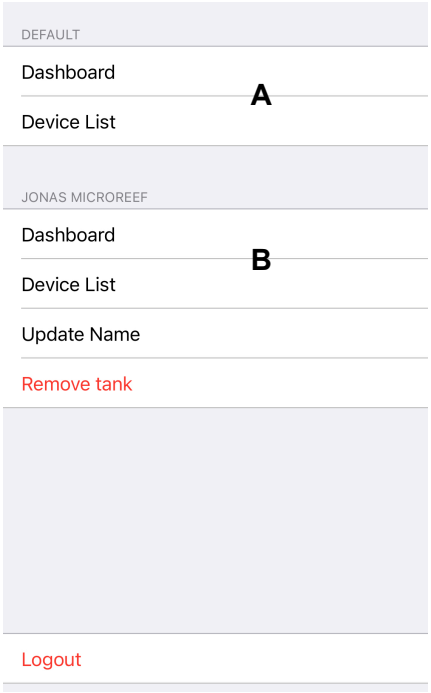
Chart below explains how many test kits you have to buy to be able to load all vials to 20 ml, and how many tests MT can do/manual test kit.

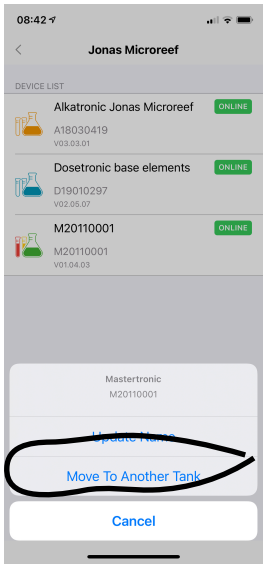
Reagent info for Mastertronic, v 1.0

Parameter	Test kit Brand	No of tests / manual set	No of full set to purchase to fill all to 20 ml
Nitrate/Nitrite	**Fauna Marin/Tropic marine PRO**	70	2
Phosphate	**Red Sea PRO**	150	1
Calcium	**API**	32	1
Magnesium	**Red Sea PRO**	50	1
Alkalinity	**Salifert**	31	2

Tank list/Device list

If MT is located in device list A then use Dashboard A.
If MT is located in device list B then use Dashboard B.
If you haven't moved MT to your tank, (section B in the pic) , then MT is as default located in dashboard A and device list A. By press Device list, and choose your unit, you can relocate it to your desired tank.





Contents in the Box

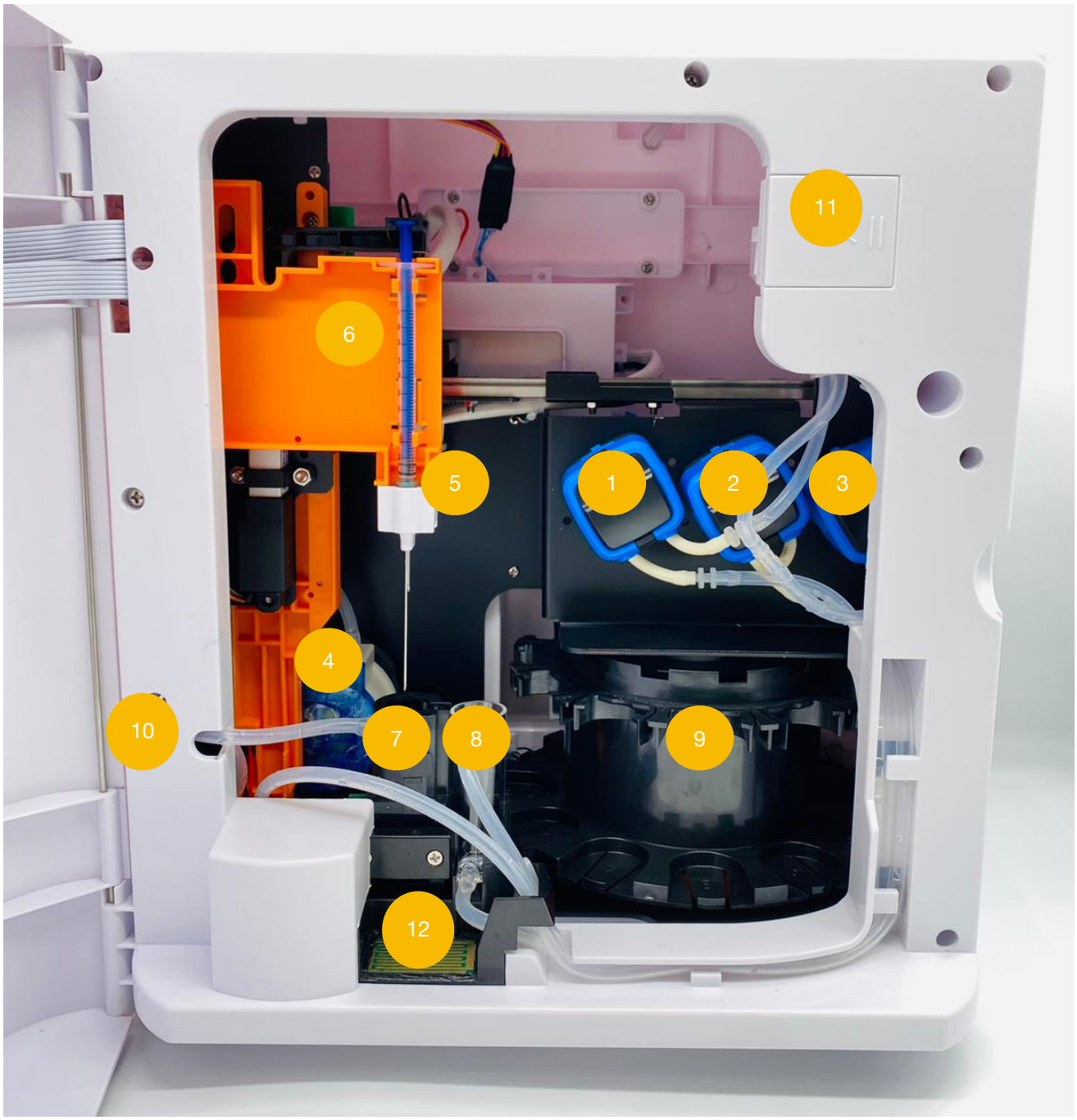
- Main unit
- 3 External Hoses, each 2 meter
- Needle stabilisator
- AC/DC adapter
- 2 Microfilter
- Needles and syringes
- 2 magnetic bars: one for reaction chamber (10x5 mm) , one extra for reagent vials (15x5 mm).

Specifications

Accuracy	NO_3	+-0.5 mg/l (within range 0-20 mg/l)
	NO_2	+-0.005 mg/l (within range 0-0.5 mg/l)
	PO_4	+-0.005 mg/l
	Mg^{2+}	+-20 mg/l
	Ca^{2+}	+-6 mg/l
	KH	+-0.15 dKH
Precision	NO_3	0.2 mg/l
	NO_2	0.002 mg/l
	PO_4	0.005 mg/l
	Mg^{2+}	20 mg/l
	Ca^{2+}	6 mg/l
	KH	0.10 dKH
Resolution	NO_3	0.01 mg/l
	NO_2	0.001 mg/l
	PO_4	0.001 mg/l
	Mg^{2+}	1 mg/l
	Ca^{2+}	1 mg/l
	KH	0.01dKH
Level of detection	NO_3	+- 0.05 mg/l
	NO_2	+-0.001 mg/l
	PO_4	+- 0.003 mg/l
Measure range	NO_3	0.05 - 40.00 mg/l
	NO_2	0.001 - 1.000 mg/l
	PO_4	0.003 - 0.200 mg/l
	Mg^{2+}	790 - 1580 mg/l
	Ca^{2+}	303 - 561 mg/l
	KH	6.08 - 12.16 dKH

Dimensions	33 (L) x 22.5 (W) x 34.5 (H) cm
Connectivity	Cloud, App
Update procedure	Wifi (Automatic update through cloud)
Software	iOS app, Android app, wifi based.
Standalone	Yes
Dosetronic compatible	Yes. Wireless communication with Dosetronic making it possible to alter the schedules in Dosetronic in desired channels based on measurements from Mastertronic.
Socket communication	Yes. Wireless communication with Focustronics sockets, making it possible to control socket on-off based on measurements from Mastertronic.

Explanation of internal items



1) Pump A
2) Pump B
3) Pump C
4) Stepper
5) Needle stabilisator
6) Syringe
7) Reaction chamber
8) Rinsing chamber
9) Reagent carousel
10) Transport screw
11) SD card slot
12) Leakage sensor

Author: ***Jonas Roman***
Cred to ***Pete Bird*** *for language corrections*