iMETOS MobiLab

extended user manual

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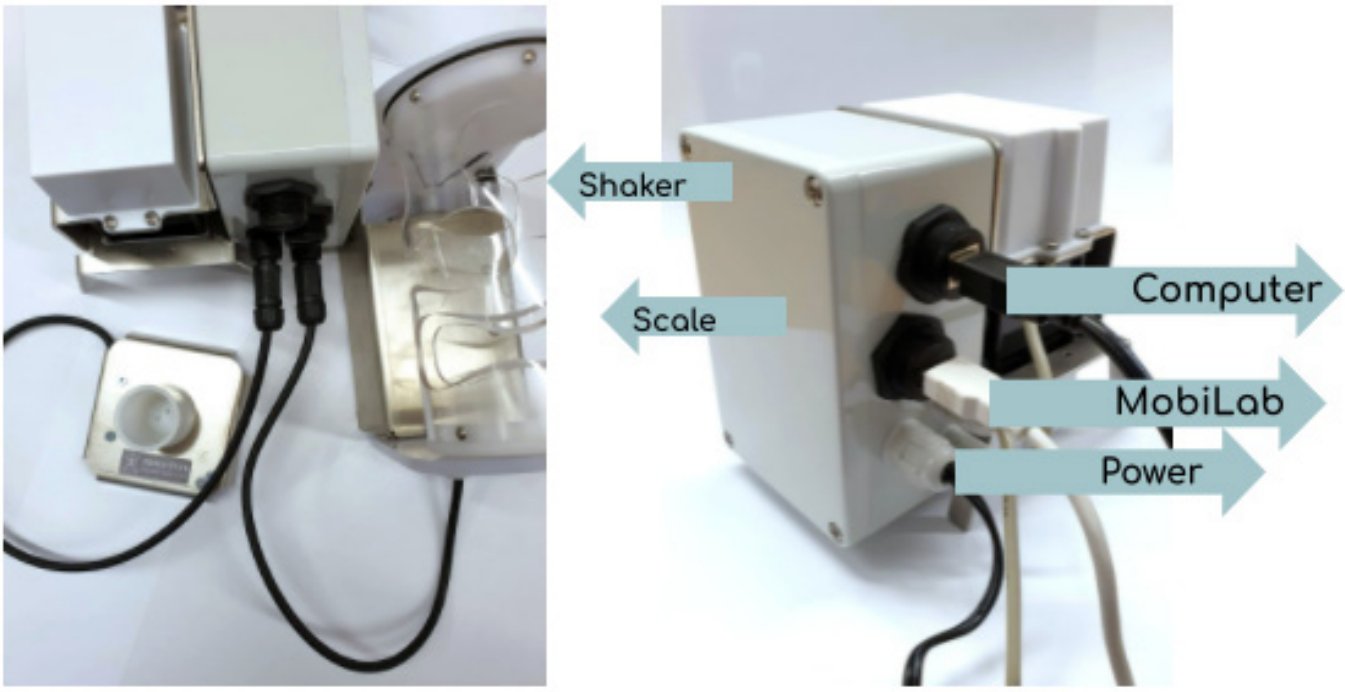
Table of Content

1. BOOTING THE SYSTEM

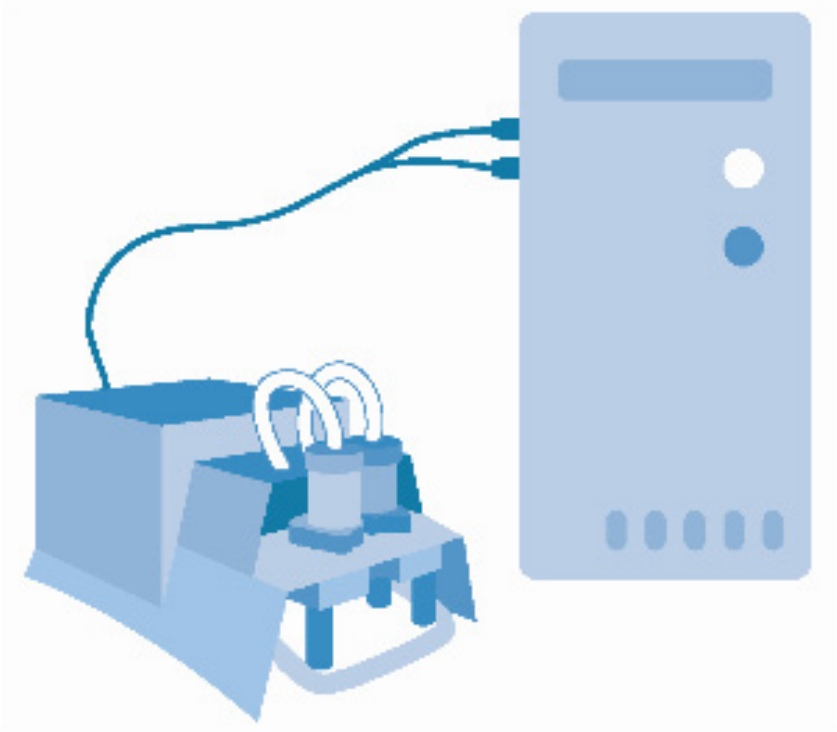
First, download the iMETOS MobiLab software. Update the software regularly. We recommend that you use a minimum Windows 10 version.

Connecting the Device

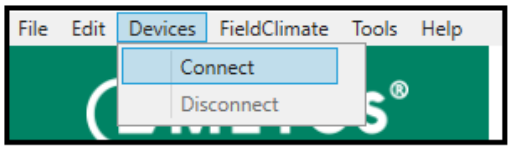
First connect all the electronic devices to each other by USB cables included in the product. Link the USB hub to i) your computer, ii) to the shaker, iii) to the weighing scale and iv) to the iMETOS MobiLab and V) to the power supply. Plug the hub to the wall adaptor or car battery.



Plant sap users find a double USB cable in the set which needs to be connected like on the following picture (2 USB connections for the computer, 1 USB connection for the MobiLab):



You will be able to verify the connection of your device via the iMETOS MobiLab Software on your Windows computer.

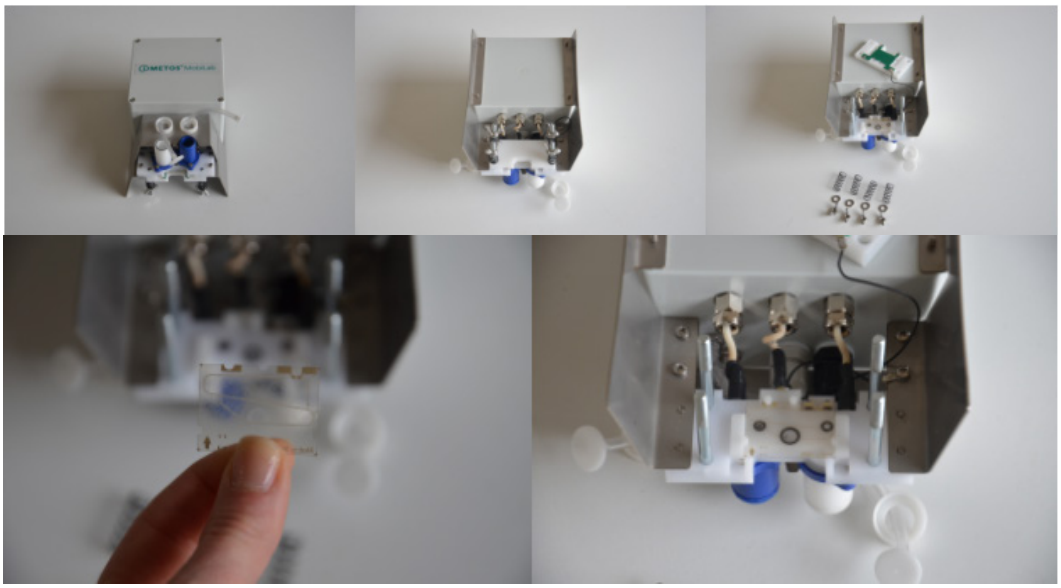


[VIDEO: iMETOS MobiLab - Booting the system]

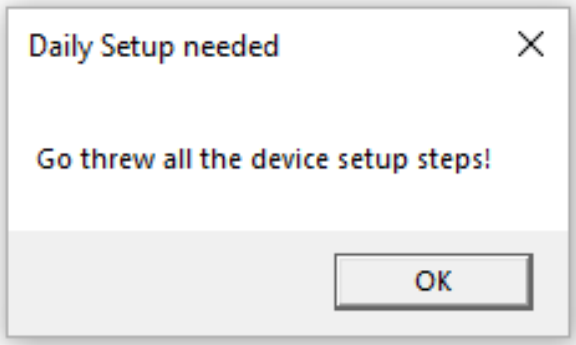
2. DEVICE SETUP STEPS

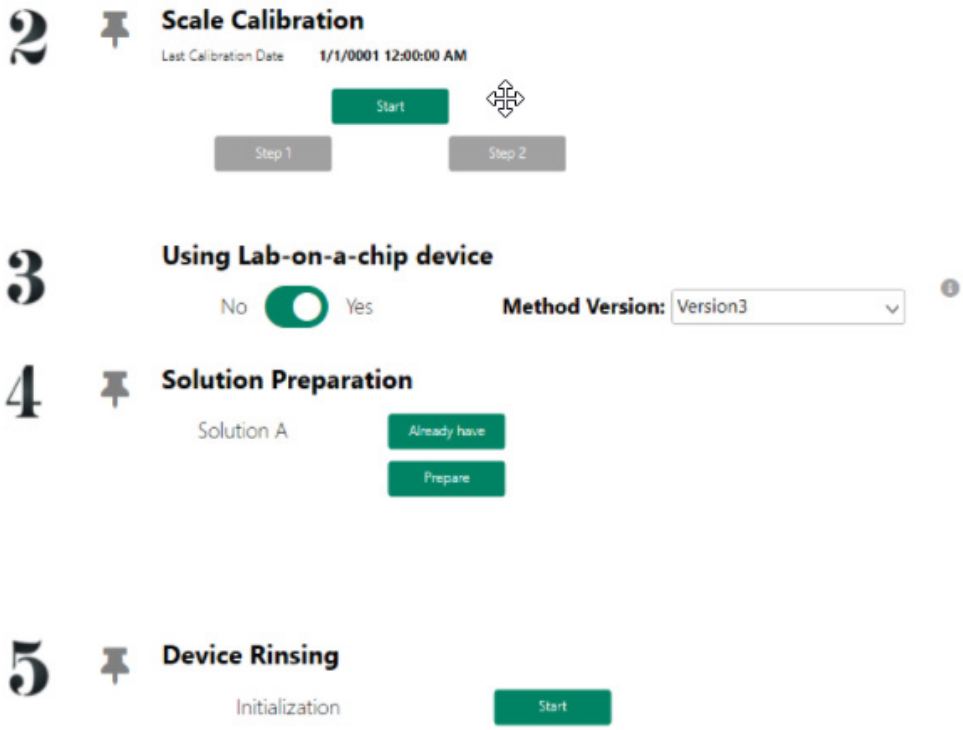
2.1 INSERT A CHIP

If no chip is present, **insert a chip** into your device first. First check if there is a run buffer in the container and if so remove it. Once empty, open the container and turn the Lab-on-a-chip device on its head. Open the 4 screws of the chip clamp. These screws will either be wing nuts or hexagon screws. In either case you have to open the screws, take care not to lose the springs and then insert the chip like shown in the picture below. The recesses of the chip fit exactly into the mold inside the chip clamp. Close the device again by using the 4 screws. Screw them tightly, however without applying force.



Every day when opening the Software for the first time, a guided setup is initiated. **Complete the Steps in the Device Setup.**



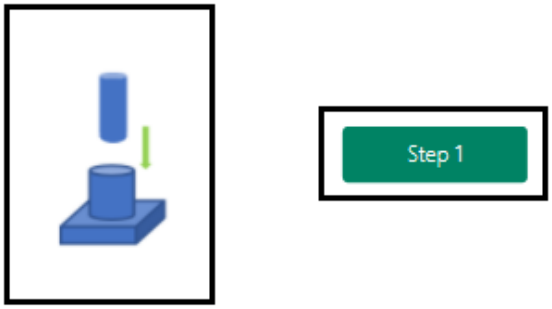


[VIDEO: iMETOS MobiLab - Inserting a chip]

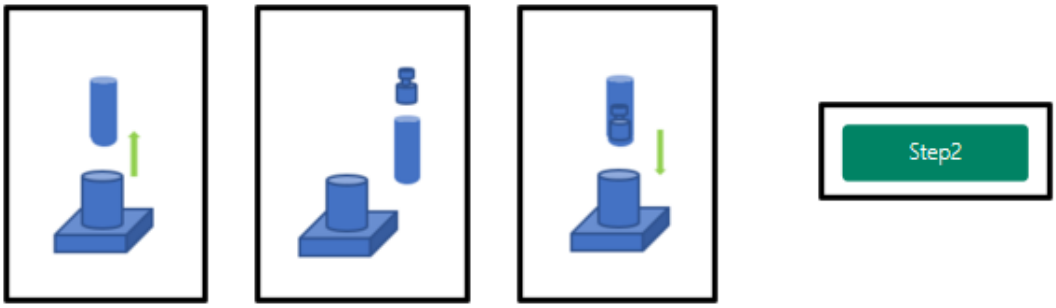
VIDEO: iMETOS MobiLab - Device setup

2.2 SCALE CALIBRATION

1. Place an empty tube on the scale and click Step 1.



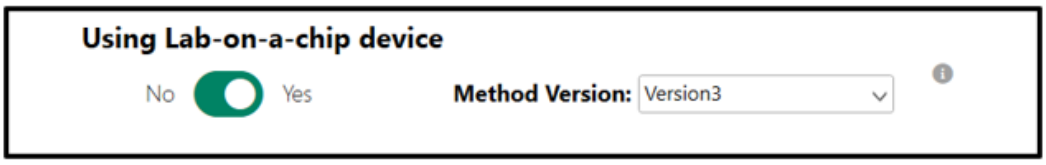
2. Take the tube out and insert the calibration weight.Put the tube gently back on the scale and click Step 2.



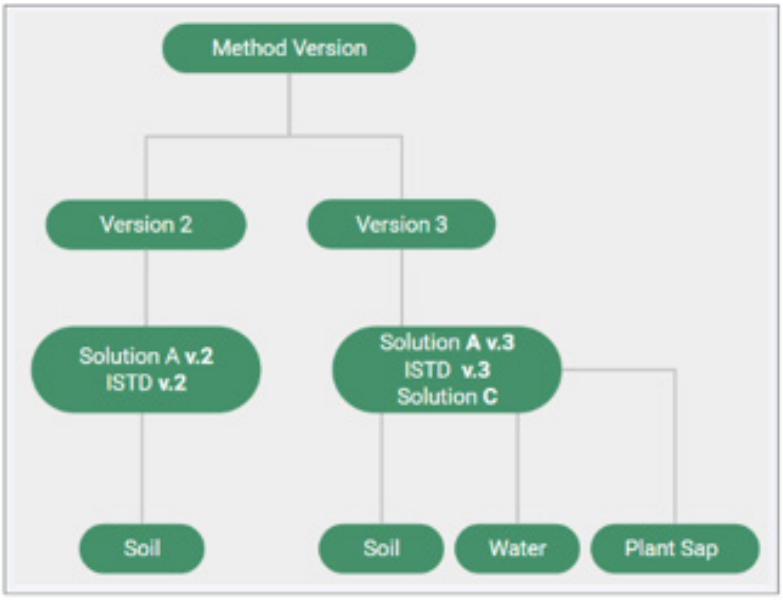
3. The Scale Calibration is done now.

Plant sap set: If you have the plant sap set, shaker and scale is not included, because the sample preparation is different.

2.3 USE YOUR LAB-ON-A-CHIP DEVICE



Choose if you want to use your Lab-on-a-chip device or an external device for your measurements. If you are going to use the former, set your Method Version.



The version depends on which ingredients your set includes. For this set choose version 3.

About the versions:
Click on Version 2, if you have Solution A from v.2 and also Internal Standard from v.2. With this version you are able to perform soil measurements.
Click on Version 3, if you have Solution A from v.3 and also Internal Standard from v.3. With this version you are able to perform soil, water and plant sap measurements.

Find the version from your solutions directly indicated on each tube.

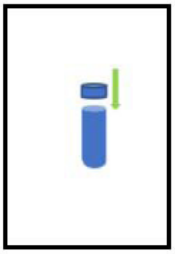
2.4 SOLUTION PREPARATION

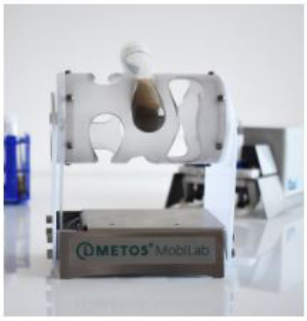
To prepare **Solution A**, click on 'Prepare'. If there is still Solution A left, click on 'Already have' and omit this step.

1. Open the 'Solution A' tube (careful not to spill any powder). Place into the scale and click 'Start'.
The powder in the solution A tube has already the right amount, for the exact ratio of your solution A, the distilled water needs to be measured.

2. Add **20g distilled water** using the squeezing bottle. A tone from your MobiLab Program will inform when you reached the threshold. **Turn on the speakers of your computer.**

3. After filling in the distilled water, cap the tube and thrust it into the **shaker** like shown in the picture to the right (don't push the tube through the center). Start the Shaker and wait until the powder is completely dissolved. You will obtain a slightly yellowish solution with no visible particles when it is completely dissolved. The shaker stops automatically after 20 min. Nevertheless, check if your solution was really completely dissolved as especially in a cold environment this can take longer. Start a new run if your solution is not clear after the first run by a click on the shaker symbol in the Instrument control.

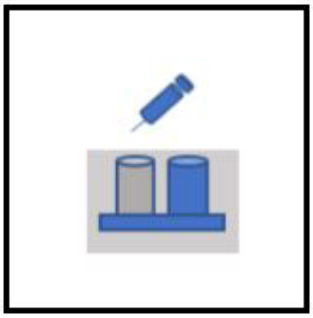




Plant sap set:
If you have the plant sap set, shaker and scale is not included, because the sample preparation is different. To prepare your solution without scale and shaker, fill **20 ml distilled water** with the **20 ml syringe** in the Solution A tube and shake it by hand till the solution is **completely dissolved**.

2.5 DEVICE RINSING

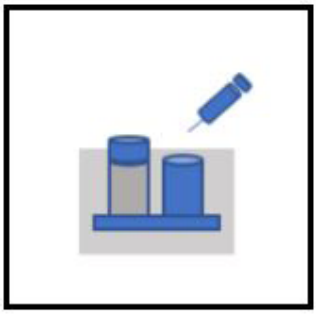
1. After Starting the Initialization, fill **4 ml of Solution A into the white (left) Container of your Lab-on-a-Chip device**. Use the 5 ml Syringe with a blunt needle from your package. Check if there are air bubbles in the small greenish hole at the bottom of the container. If so, remove them (by gently stirring or taking it up with the syringe)! Now close the screwing cap of the container and click Play.



For this rinsing it is just necessary to have the solution in the white container, as the pump of the device presses the liquid from the white into the blue container.

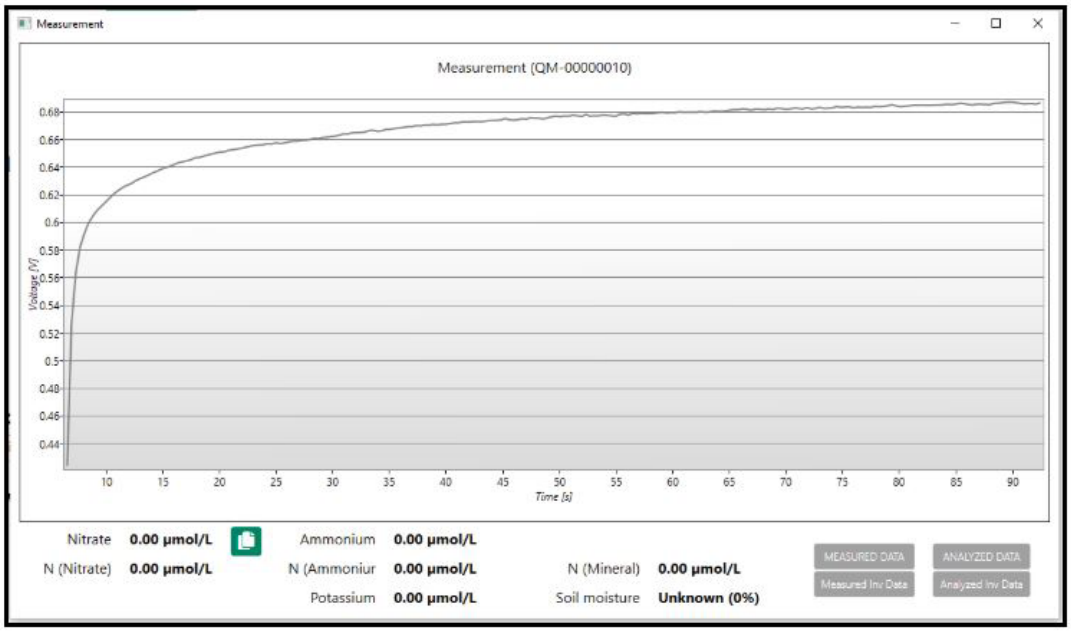
Please check if there is a droplet formation on the bottom of the **blue container**. If so, your chip conducts the liquid well and everything is fine.

2. The rinsing will stop automatically. After the rinsing, fill 5 ml of Solution A (the same as before) into the blue (right) Container. Again remove air bubbles, if there are any, and close the screwing cap.



2.6 TEST MEASUREMENT

Now you can do a test measurement.



This is how a perfect Baseline looks like.

Now your device is ready for measurement. In the next chapter, we will learn how to prepare the samples.

3. SAMPLE PREPARATION

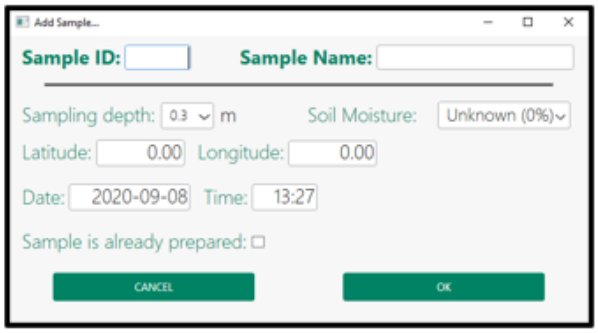
3.1 SOIL

Sieve your soil through a 2 – 3 mm mesh sieve. Remove stones, plant parts or animals and mix the sieved soil well. All the organic material must be removed! After using the sieve, try to clean it roughly so that there are no contaminations in the following sample.

If there are given extreme environmental field conditions such as very high or low temperature, more dependable results are obtained by making indoor measurement preparations.

Open the Sample control tab, choose the Soil Tab and add a Sample!

The Sample ID is created by the MobiLab Sampler App for your android phone. Read more about this in the MobiLab Sampler Manual. If you do not use the app, create your own Sample ID within your MobiLab software.



After creating and labeling your sample (here it's 123) it will be shown in a row in the Sampletable.

Simply follow the buttons which appear in the row one by one. First, determine the weight of your sieved soil sample. For this, put an empty tube in the scale and click '**SET WEIGHT**'. (If the empty tube is not ~0g, click 'Tare')

Fill the tube with **10 g** sieved (and well mixed) soil and click '**SAVE**'. There is a tolerance of 10 %, meaning anything from 9 g to 11 g will be accepted.

3.1.1. ADD DISTILLED WATER

A new button appears. **Simply leave the tube on the scale** and click '**SET WEIGHT**' for adding the water. Add 20 g of distilled water (equals 20 ml) to your soil, with the squeezing flask. Also here a tolerance of 10 % applies. This means adding anything from 18 to 22 ml will be accepted.

Click '**SAVE**'.

3.1.2. SHAKE THE SAMPLE

1. Remove the tube from the scale, cap it, write the sample ID on it and put it into the shaker. Now start the **Shaker timer**. The timer will count 20 minutes and then you can go on with the preparation.

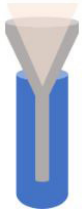
2. **After 20 minutes**, your sample is well mixed. Stop the shaker by using the shaker symbol on the left side of the software and place the tube into the rack. Continue the shaker by clicking on the same symbol if you have more samples on it.

If you prepare **samples in parallel**, you can start the next sample preparation during this 20 minutes shaking time. The shaker can handle 6 samples in parallel.

3.1.3. FILTRATE THE SAMPLE

1. Place a new tube next to the one you just prepared in the rack and put a funnel on top of it.

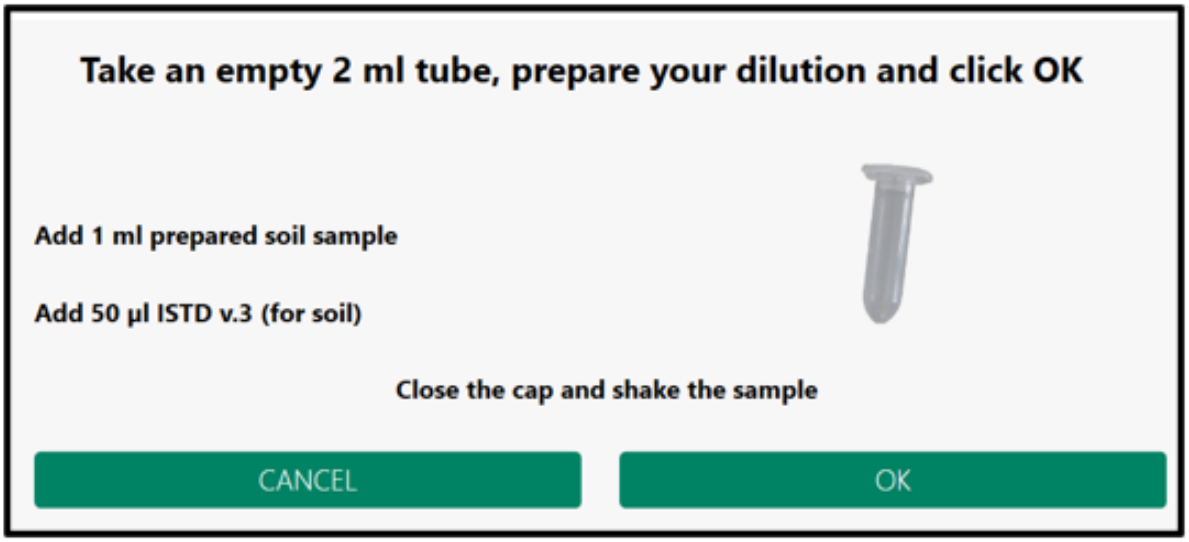
2. Take a filter paper, place it in the funnel and fill the whole sample into the funnel. This should result in a more or less clear liquid.



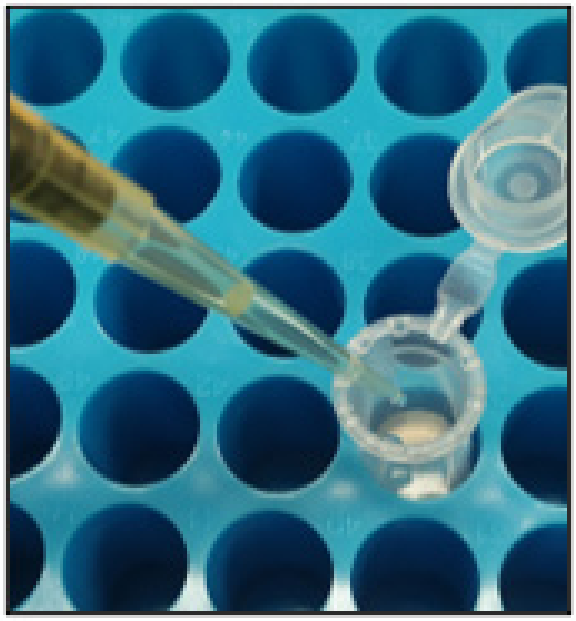
3. Now you can click on the filtration symbol.

3.1.4. TRANSFER THE SAMPLE

Take an empty 2 ml tube and prepare your dilution:



Add 1 ml (this is 1000 µl) of filtrated soil sample and then add 50 µl of the Internal Standard Solution v.3 for SOIL. Close the cap of the tube, shake it for some seconds and **your sample is now ready and you can jump to section 4. Measurement**.



[VIDEO: iMETOS MobiLab - Soil sample preparation]

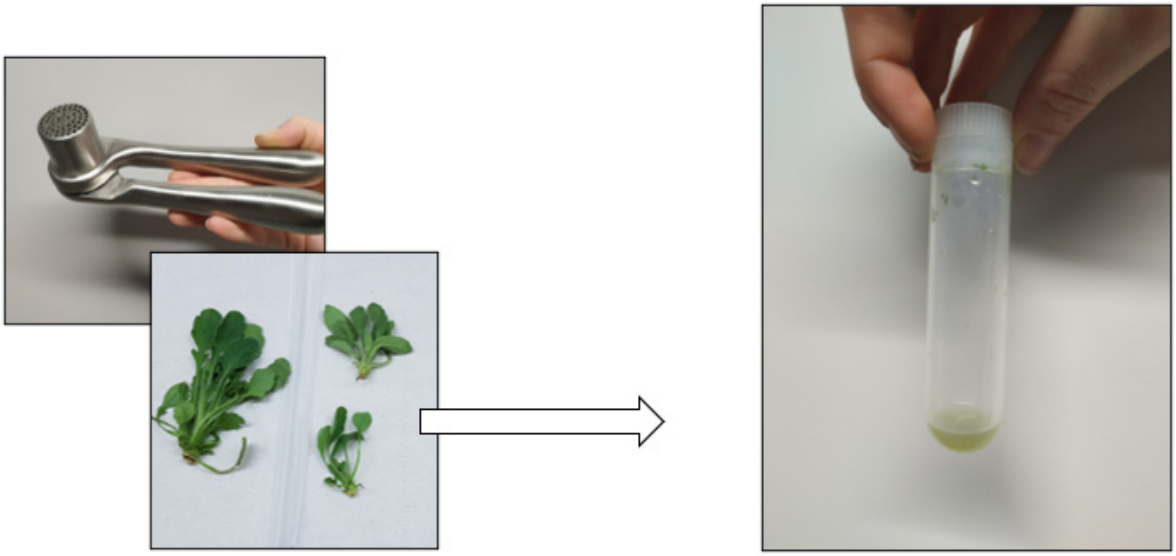
3.2 PLANT SAP

3.2.1. SQUEEZE SAP

If there are given extreme environmental field conditions such as very high or low temperature, more dependable results are obtained by making indoor measurement preparations.

Collect leaves together with the leaf stems (petiole) of the plant in question. From each plant you want to sample, collect young leaves and old leaves. A young leaf is normally to be found on the top of a plant next to the apex. It is already developed and active and in size (nearly) like the other fully developed leaves. Old leaves are to be found on the bottom of the plant, they are still active (meaning not brownish, already rotten or in any other way senescent) and look healthy. Cut off the Leaf from each and collect in one bag all the petioles from the old and in the other bag, all the petioles from the young ones.

Press them (all young together and all old together) through the garlic press into an empty 30 ml Tube. At least 100 µl are required as you need 50 µl later for the dilution.

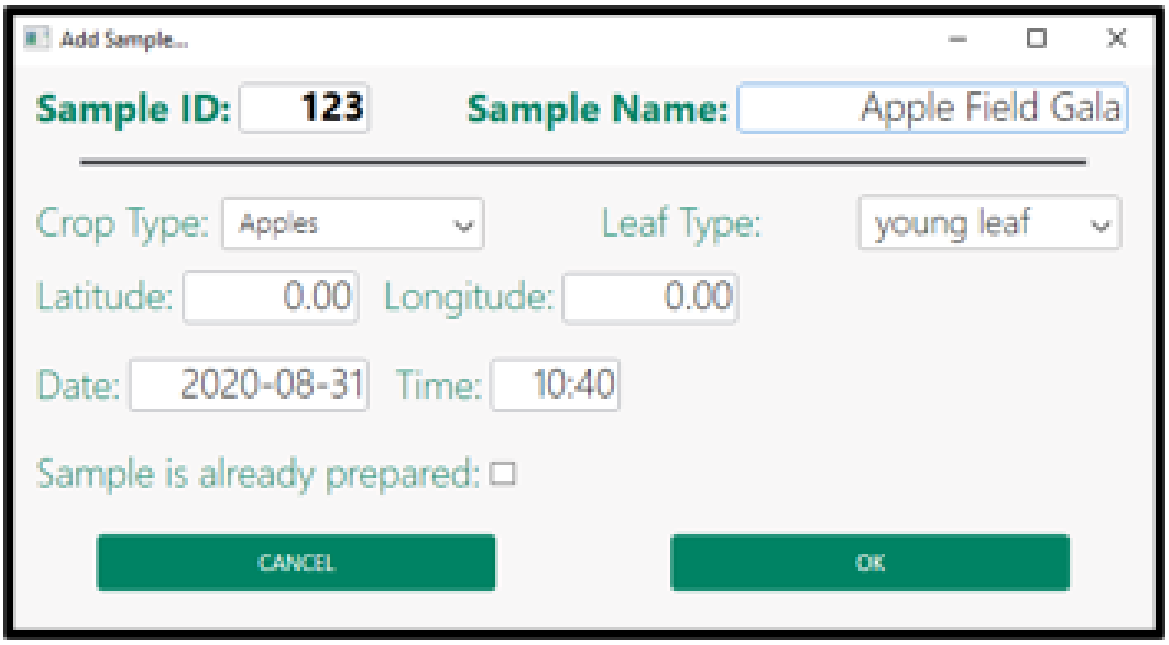


3.2.2. ADD NEW SAMPLE

After the first time clicking on the Tab 'Samples', choose 'Plant Sap' and you will be guided to the corresponding sample table.

Take the plant sap, which you collected before and add a new Sample in the Table.

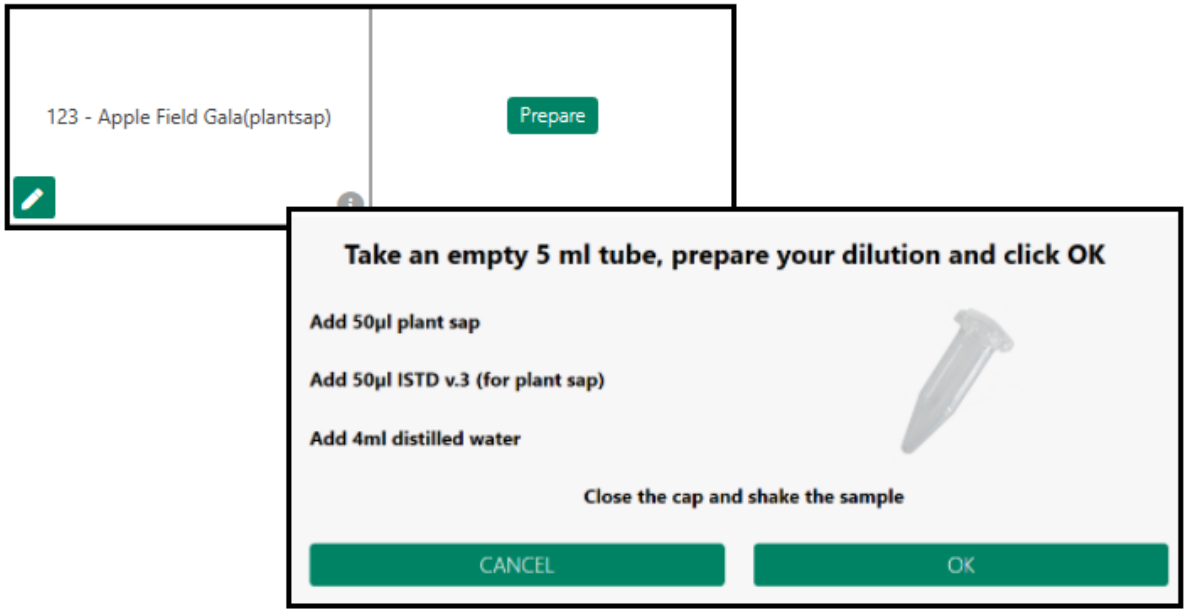
The Sample ID is created by the MobiLab Sampler App for your android phone. Read more about this in the MobiLab Sampler Manual for plant sap. If you do not use the app, create your own Sample ID within your MobiLab software.



After creating and labeling your sample (here the ID is 123) it will be shown in a row in the Sampletable.

Simply follow the buttons which appear in the row one by one.

3.2.3. DILUTE THE SAMPLE



Prepare your dilution:
First, take an empty 5 ml tube and add 50 µl from your plant sap (with the 50µl pipette, fresh tip). Add 50 µl from your Internal Standard v.3 for plant sap (with the 50µl pipette, fresh tip) and 4 ml distilled water (4 times with the 1000µl pipette, fresh tip). Close the cap and shake the sample. **Now your sample is ready and you can jump to section 4. Measurement.**

3.3 WATER

3.3.1. ADD NEW SAMPLE

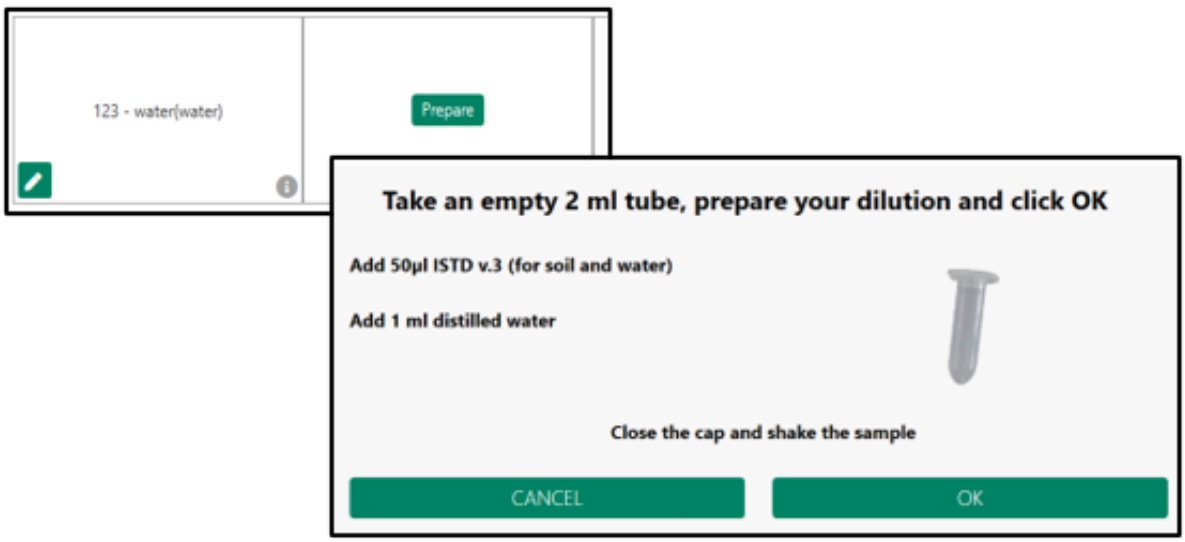
After the first time clicking on the Tab 'Samples', choose 'Water' and you will be guided to the corresponding sample table.

Take the water, which you collected before and add a new Sample in the Table.

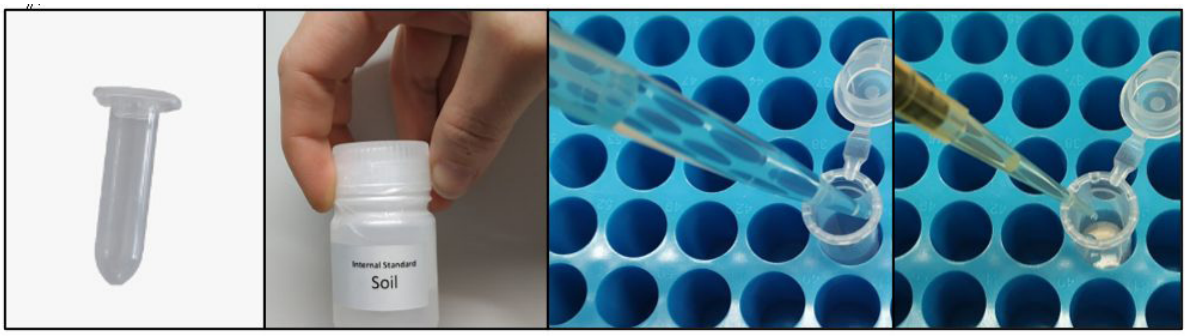
After creating and labeling your sample (here the ID is 123) it will be shown in a row in the Sample table.

Simply follow the buttons which appear in the row one by one.

3.3.2. DILUTE THE SAMPLE



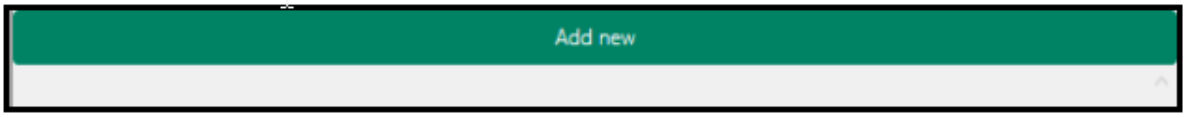
Prepare your dilution:
First, take an empty 2 ml tube and add 50 µl from your Internal Standard v.3 for soil (with the 50µl pipette, fresh tip). Add 1000 µl from your water sample (with the 1000µl pipette, fresh tip). **Close the cap and shake the sample. Now your sample is ready for the measurement.**



4. MEASUREMENT

4.1. CHOOSE DEVICE AND NUTRIENTS

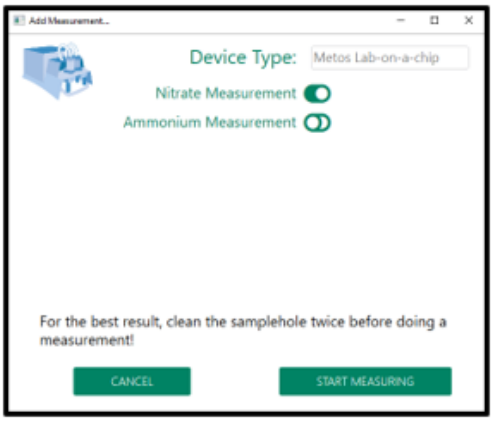
After finishing the last step in the sample row, a ‘Add new’ button appears.



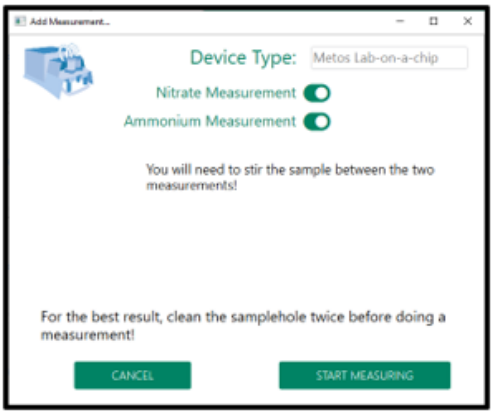
1. Click on it, choose which measurement device...

2. and which nutrients you want to measure and start the measurement.

If you want to measure both, the sample needs to be stirred in between the measurements.

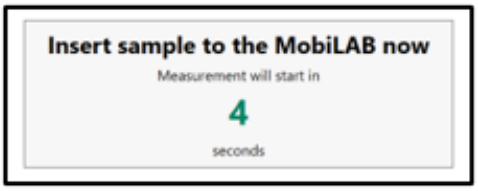


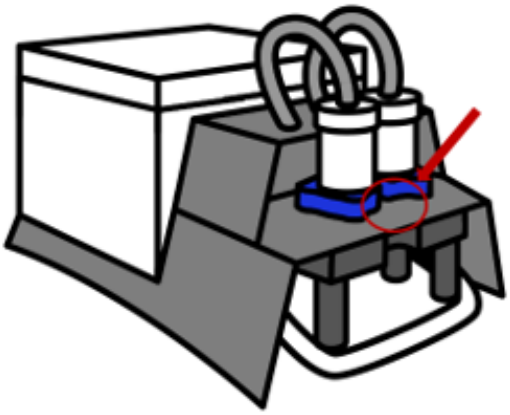
3. Click on **START MEASUREMENT**
and wait with adding the sample, till the countdown appears.



4.2. ADD THE SAMPLE TO THE DEVICE

Take a fresh yellow tip with the 50 µl pipette and take up your finished sample from the small vial.
Add it into the **small hole of the Lab-on-a-Chip device, during a 10 seconds time window announced by the software**. The measurement is now running. You see now a graph in a window on the bottom right in the software. The graph will be maximized if you click on this window.





Wait until ‘finished’ pops up and then remove your sample with the pipette.

-> for leaving your device for more than 1 hour unattended, fill distilled water inside the sample hole, this will protect your chip.

Rinse the sample hole **2 times with distilled water** before measuring the next sample for the best result. A maximum of 100µl sample volume is required.

5. CLEANING

MobiLab loves to be cleaned!

When you finish the use of your Lab-on-a-Chip for the day, click on the Cleaning symbol and follow the Cleaning guide.

Remove the Solution A (Runbuffer) from the containers by using the syringe. Also **remove the sample** with the pipette and fill in a bit of distilled water. Fill both containers with **1 or 2 ml of distilled water**, close them and click on next. **The chip is now being rinsed**. Take a fresh pipette tip and rinse the sample hole with distilled water.

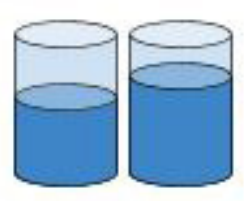
If you are to put the MobiLab for a longer rest (more than 3 days) remove the water from every container and sample hole and store the device.

VIDEO: iMETOS MobiLab - Cleaning

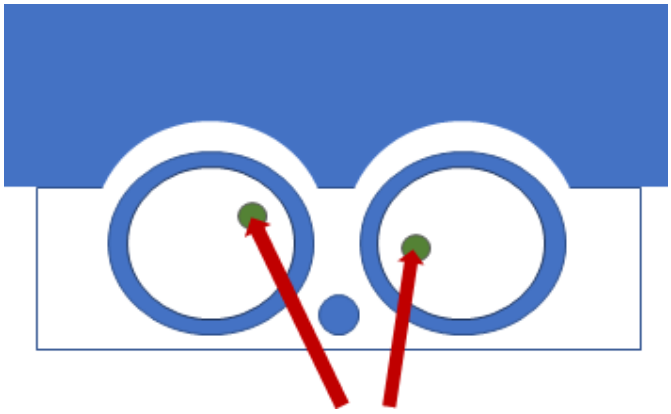
6. WHAT YOU SHOULD KNOW

- **The solution levels in the device are very important for your results!** (Left 4ml/Right 5ml of Runbuffer/ Solution A).

They will change after every measurement. **AFTER EVERY 10th measurement**, you should transfer (~200µL/ first line from 5ml syringe) solution from the right container – to the left container!!
The levels of the solution should look like this. (see picture)



- After every measured sample, **rinse the sample hole** with the following sample (or distilled water) to improve your results.
- The Sample hole should **not run dry** (i.e. no sample or water) for more than 15 minutes.
- When you want to **change the chip**, ALWAYS remove all liquids from the device first! Clean the old chip with distilled water (see cleaning) , remove the water and then put in the new chip. A new Initialization is needed then (device setup).
- To get a good measurement keep your system always **AIRBUBBLE-FREE**:
  These 2 holes are connecting the chip directly. Remove air bubbles with the syringe!



- **Do not spill any liquid** on the chip clamp. Liquids are to be put just into the containers and the sample hole.
- **After cleaning leave the chip inside the device.** The chip ages with every time you insert or remove it.
- Soil samples have to be measured as soon as possible after preparation. Try not to exceed **15 minutes**.
- Store your prepared Solution A in the **fridge** (lifetime 1-2 weeks) or in the **freezer** (lifetime up to one year) to avoid biological degradation. The duration at room temperature is roughly 3 days.
- And finally, once per usage month you should apply silicone grease on the 3 O-rings inside of the chip clamp. This helps to **avoid a leakage**. (see Help/FAQ in the software)

If you have problems with a section above please contact our Pessl Instruments support service.

We are also always happy to get feedback!