

# UV254 GO! Portable



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Instruction Manual

Visit Page 1



[www.photonicmeasurements.com](http://www.photonicmeasurements.com)

# About Us



## Company Mission

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Photonic Measurements are the experts in UV254. We can provide solutions for the measurement of UV254 in all applications within the drinking and waste water treatment, industrial effluent, receiving water and environmental testing, amongst others. Photonic Measurements range of UV254 products allow for the measurement of UV254 and its surrogates TOC, DOC, COD and BOD that fit your application needs.



The range of parameters/measurements that the company offers is expanding. Please visit [PhotonicMeasurements.com](http://PhotonicMeasurements.com) for more information

Established in 2014, Photonic Measurements is located in Lisburn, Northern Ireland, UK.



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## Safety Advice

When using the UV254 GO! please ensure you read the manual thoroughly and follow the instructions provided.

Ensure that all necessary equipment provided in the kit is of the standard described upon purchase.

Do not use this instrument for any other usage aside from what is instructed within the manual.

Please ensure that USB port is clean and dry prior to use, remove any object that could interfere with access to the charging port.

The UV254 GO! does not require any specific cleaning for daily operation. However, a dry cloth can be used to collect dust. Do not use cleaning agents or solvents on the UV254 GO!

# Introduction



Photonic Measurements' **UV254 GO!** is a light-weight, portable device, which fits in the palm of your hand. With rechargeable Li-ion battery applications the **UV254 GO!** is a lab quality device that provides quick and easy measurement. Simply place a sample in the analyser cuvette and you will get your results within seconds.

- A simple icon-based user interface makes it easy to navigate between measuring, calibration and data collection.
- Long service life.
- Extensive storage capacity to preserve numerous measurements.
- Ability to generate graphical charts of data patterns.
- A USB port to connect and transfer data to your PC or Mac.
- Excel compatible, connect with device to examine data further.
- Ability to display up to four surrogate (Calibrated parameters) measurements simultaneously. For example, TOC (Total Organic Carbon).

# Start-Up Guide



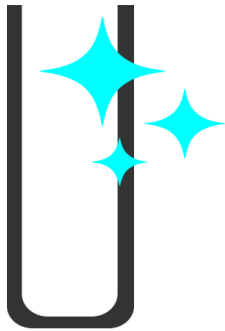
# UV254 Go! Start Up Guide



1. Sample Chamber Lid
2. USB Charging Port with Cap
3. USB Charging Connection Socket
4. On/Off switch
5. Touchscreen Menu
6. Serial Number

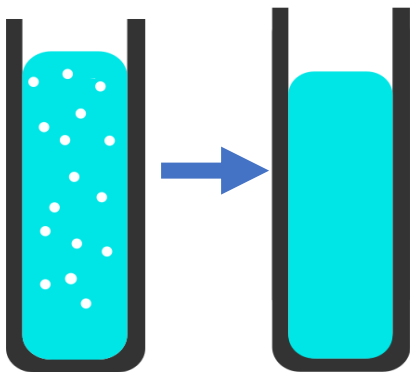
## Guidelines for Use

The following steps should be used to ensure the **GO!** is used correctly and most efficiently to obtain accurate results.



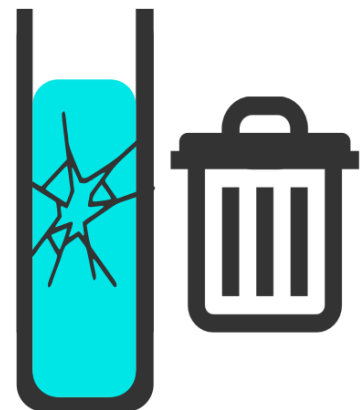
Use **ONLY** a clean sample cuvette and rinse before use.

With a dry cloth wipe the cuvette to ensure no fingerprints are present on the sample tube



Gently tap the cuvette on a flat surface to remove any bubbles from the sample

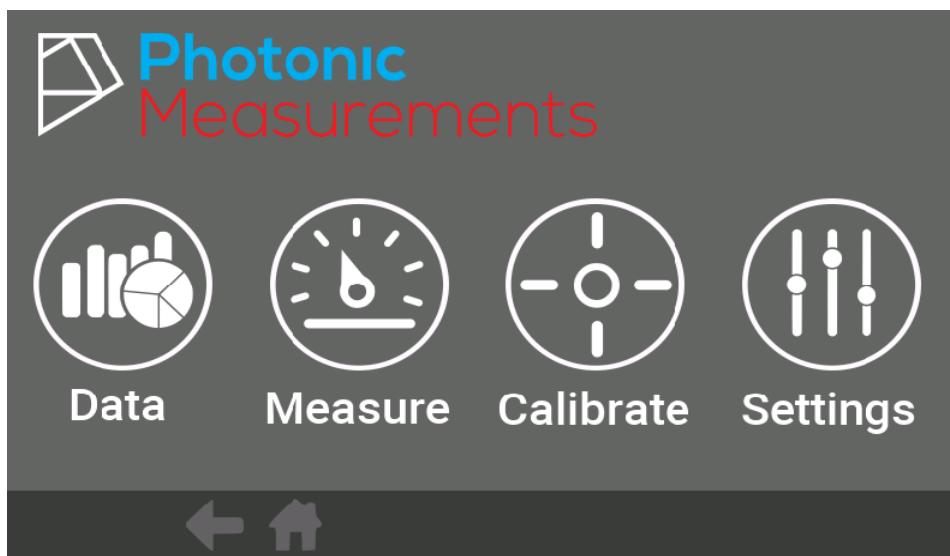
Sample cuvettes that have scratch marks or have been contaminated should be safely removed.





## Menu Screen

The Touchscreen Menu Screen allows the user to simply navigate through the four main sections of the analyser.



**DATA-** Allows user to view collection of past measurement data.



**MEASURE-** Takes a UVT/UVA reading and various surrogate/calibrated measurements at different locations.



**CALIBRATE-** Add parameters and create a profile for different water sampling points/locations.



**SETTING-** Adjust time/date, power and brightness for power save.

## Data Menu

Results collected will be stored on the device. Up to tens of thousands of results can be collected and stored for the duration of the analyser.

To view a result, select the year – you would like to review, and press **SELECT**

Continue by narrowing down your selection by choosing a month within that year.

All results obtained within that month will be displayed, select the day you wish to view. All results from that day will be displayed.

To see a plot of results of a period of time, choose one **location** and one **parameter** and then press the graph icon.

A graph like this will appear.

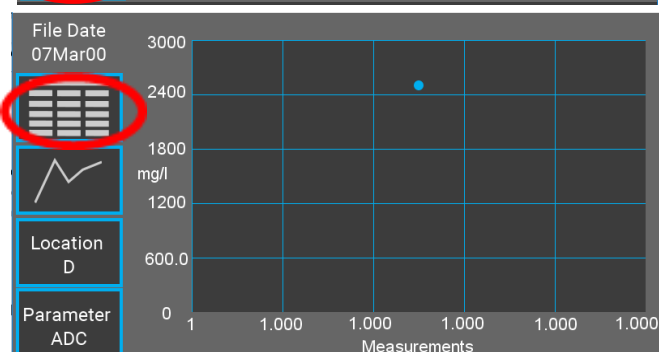
Press the grid icon if you would like to return to a table view of results.

Folder	File	Name
		con1.go
		con1.go
		con1.go
		con1.go
		con1.go

File Date	Sample	Time	Parameter	Value	Units
07Mar00	Sample0	00	ADC	2500.0	mg/l
	Sample1	05:12:00	ABC	1.0	%
	Sample2	05:12:00	ABC	2.0	%
	Sample3	05:12:00	ABC	3.0	%
	Sample4	05:12:00	ABC	4.0	%
	Sample5	05:12:00	ABC	5.0	%
	Sample6	05:12:00	ABC	6.0	%
	Sample7	05:12:00	ABC	7.0	%
	Sample8	05:12:00	ABC	8.0	%

File Date	Select Location
07Mar00	All
	D
	A

File Date	Select Parameter
07Mar00	All
	ADC
	ABC



## Measure Menu

### Step 1:

When clicking onto **MEASURE**, select from the list of cuvette paths that you will be testing.

See appendix for information on path length.

Press **OK** to continue.

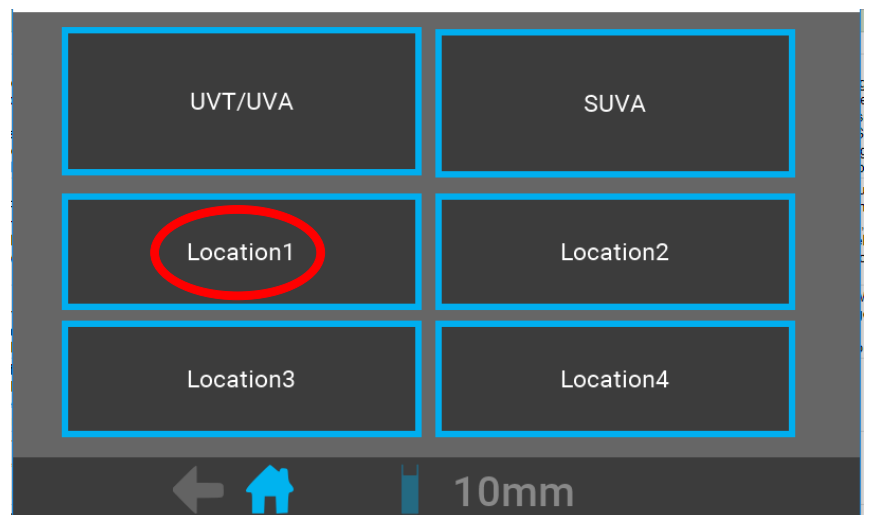


The cuvette path selected will appear at the bottom of the screen.

### Step 2:

Next, begin by selecting the **MEASUREMENT ROUTINE**

For this example, we will select **Location1**



## Measurement Routine

**UVT/UVA-** Is the measurement of Ultraviolet Transmission and Absorbance at 254nm.

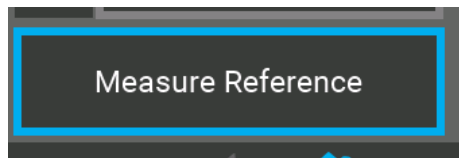
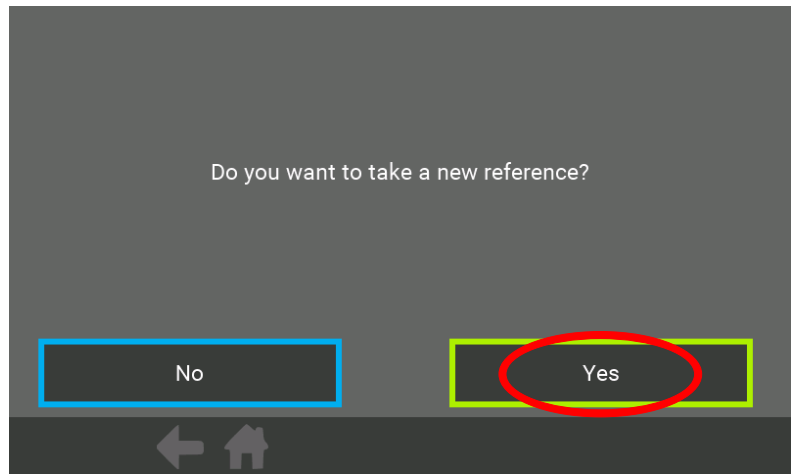
**SUVA-** Provides a measurement in relation to EPA415.3 DOC Input from another device will be required for this method. (Please review the standard)

**Locations-** These can be acquired through user calibration of measurements of parameters/ surrogates that relate to UVA.



### Step 3:

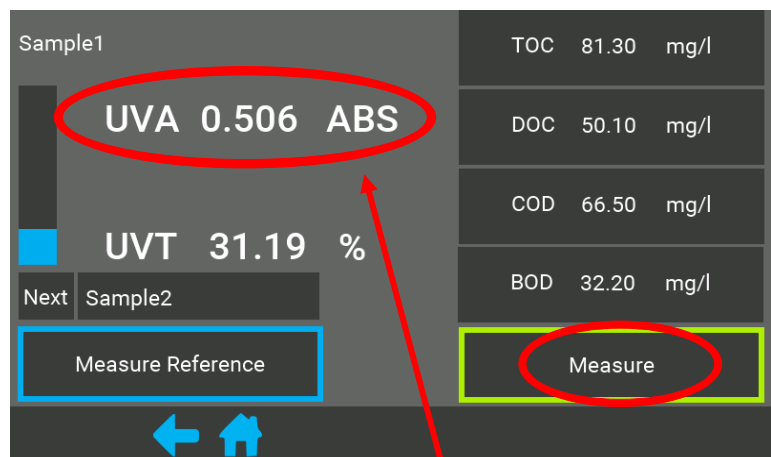
Place reference cell  
(deionised water) into the  
**GO!**



### Step 4:

Place sample into **GO!** and  
measure.

To maintain accuracy, use the  
same cell that was used to take  
reference point



UVA/UVT are direct measurements

The list on the right-hand side is the user calibrated  
surrogate measurements

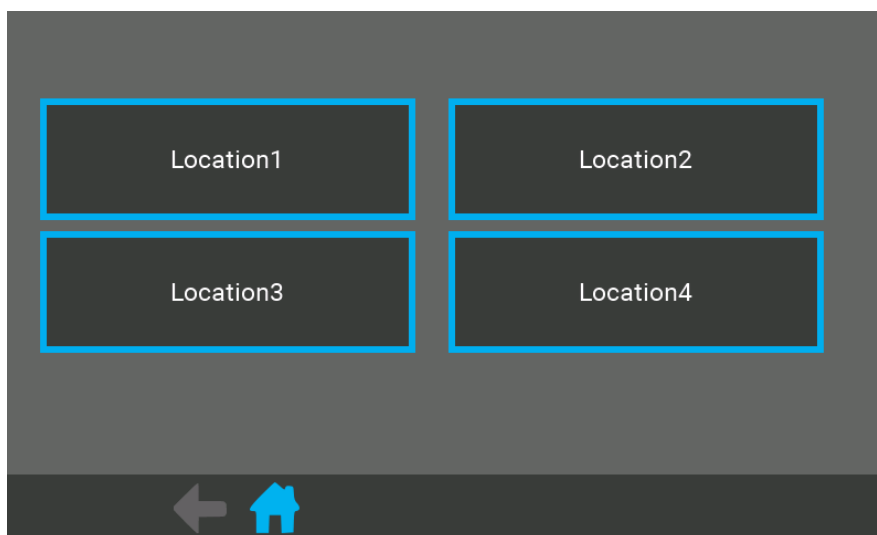
## Calibration Menu

The Calibrate menu button allows you to create a profile for a range of parameters known to respond to the changes in absorption at 254nm.

Also, the ability to store these parameters from different sample points as the response can change from location to location.

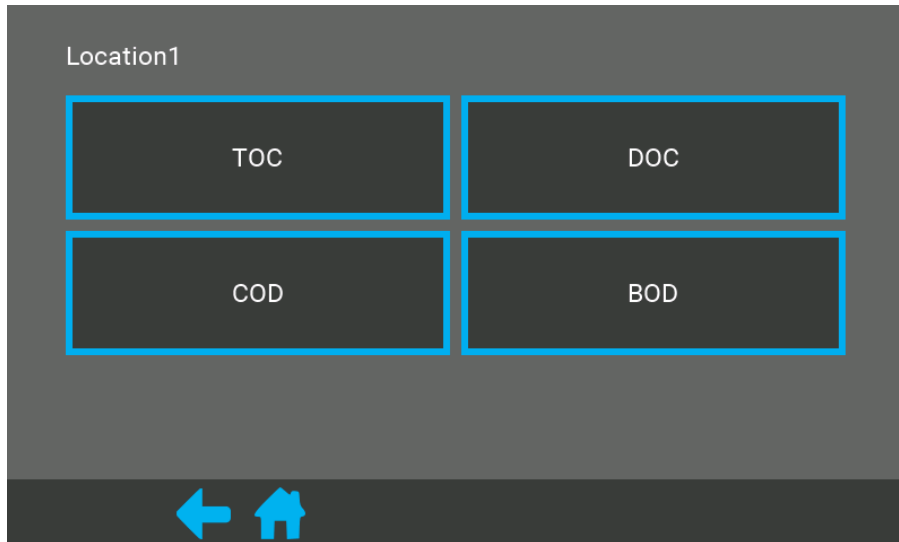
For calibration procedure examples, please refer to appendixes

Select a location you wish to calibrate; the name of the sample can be changed at a later stage.



User calibrated measurements of parameters/ surrogates that correlate to UV254 absorption. Parameters include; **TOC, DOC, COD** and **BOD** amongst others calibrated to UV254

Select a **Parameter**

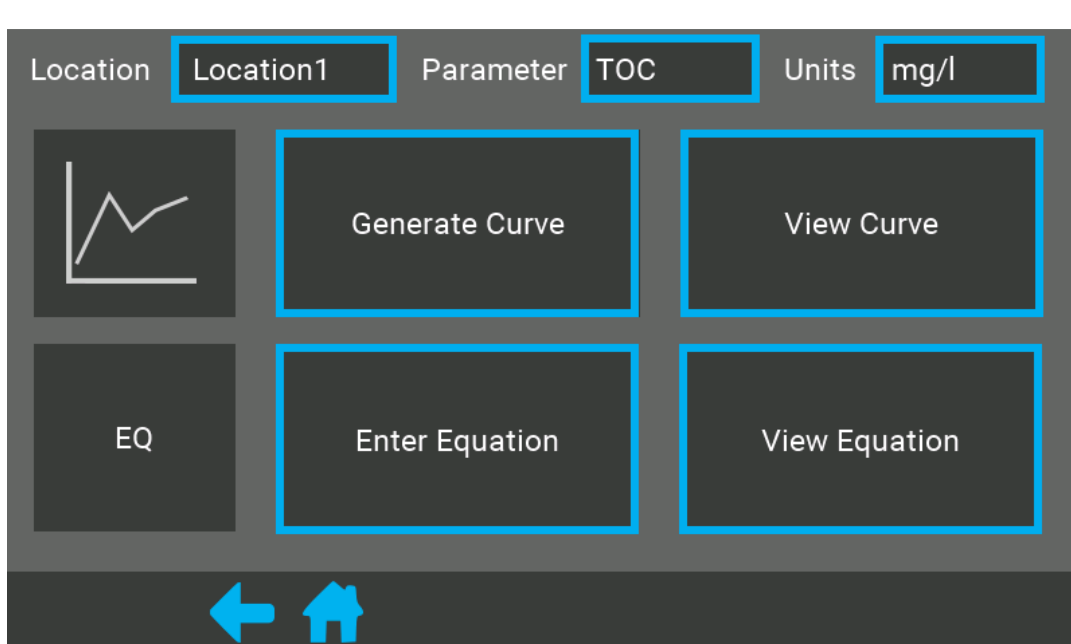


At this stage if the parameter you selected is not there this can easily be adjusted by simply selecting the item you want to change.



This will also apply if you would like to modify, edit the location, parameter or units name, simple click on the blue box for each component.

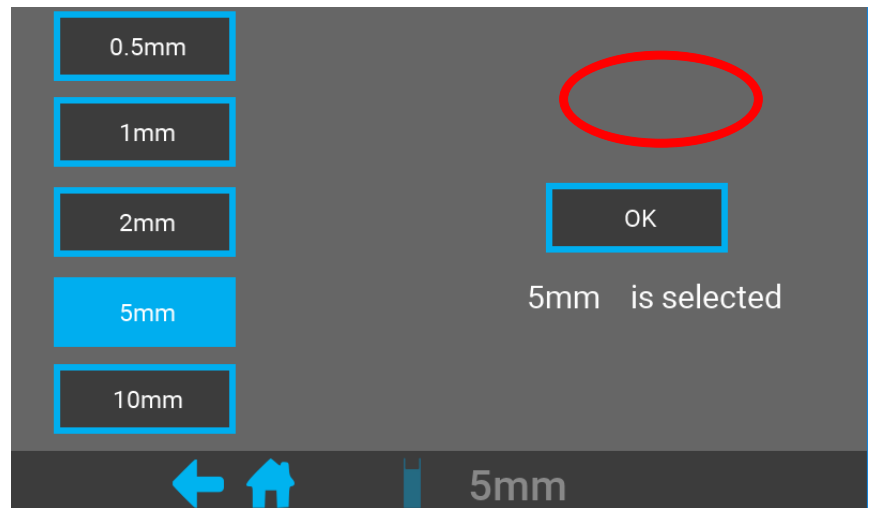
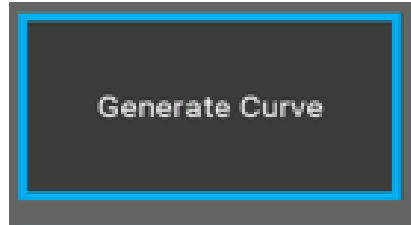
When Calibrating, four options will appear on screen like so:



# 1. Generate Curve

## Step 1:

After clicking **Generate Curve**, select the sample size from the list and then click **OK**



## Step 2:

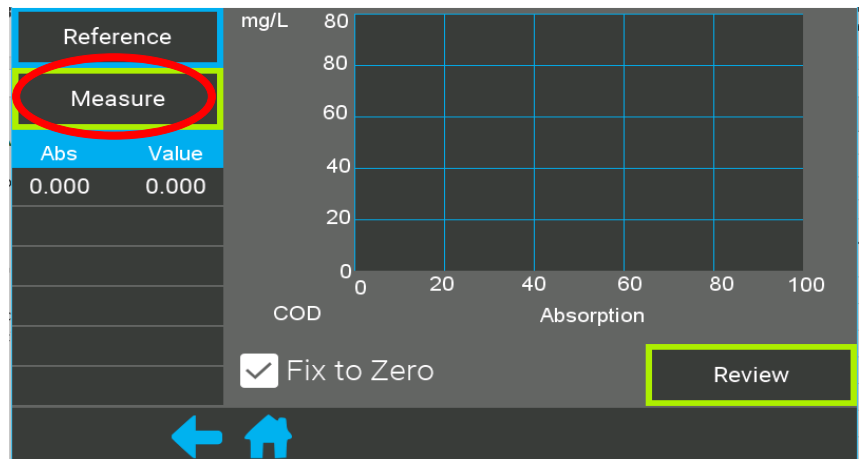
Prepare a reference sample  
Then click **REFERENCE**





### Step 3:

Leave reference sample in the **GO!** and press **MEASURE**



### Step 4:

Enter the concentration, for the reference cell it will be 0.0mg/L

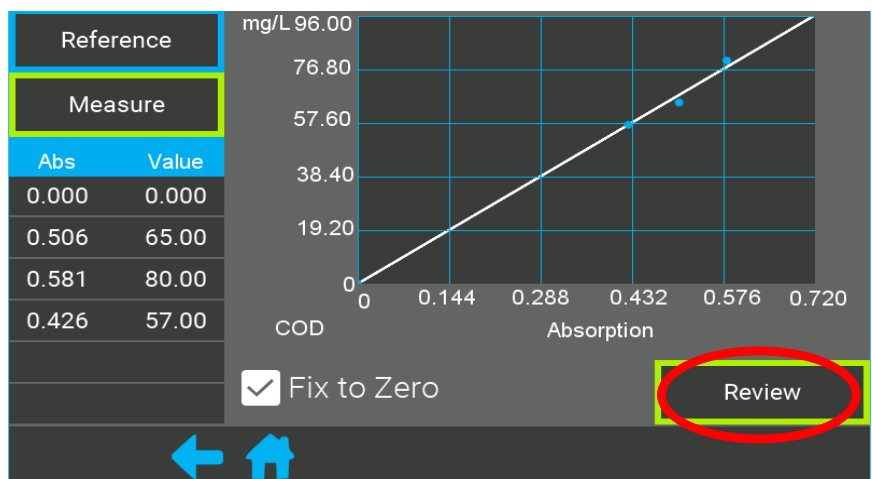
The screenshot shows a dark grey input field with the text 'Enter Value' on the left and '0 mg/l' on the right. The '0' is inside a black rectangular box.

Repeat for each sample of your samples

### Step 5:

The points will appear on the graph and the initial reference point (0.0mg/L)

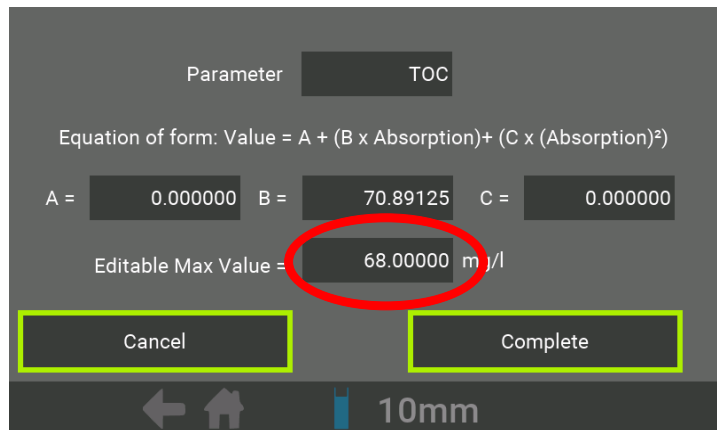
When you are satisfied with your results from the calibration press **REVIEW**



**NOTE:** Number of samples will be down to your own lab procedure.

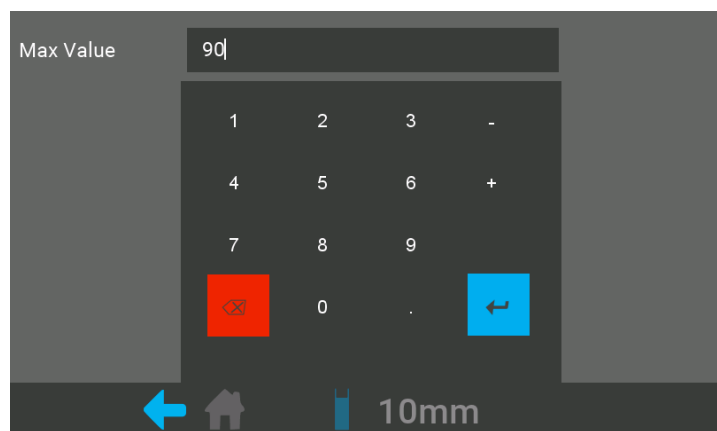
### Step 6:

In review check that the maximum value for the calibration is set to a limit your happy with.



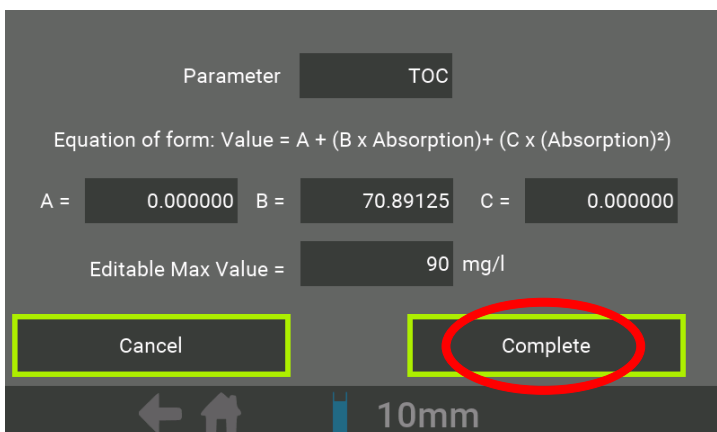
Click on the editable max value to change it.

Enter a new value if necessary



### Step 7:

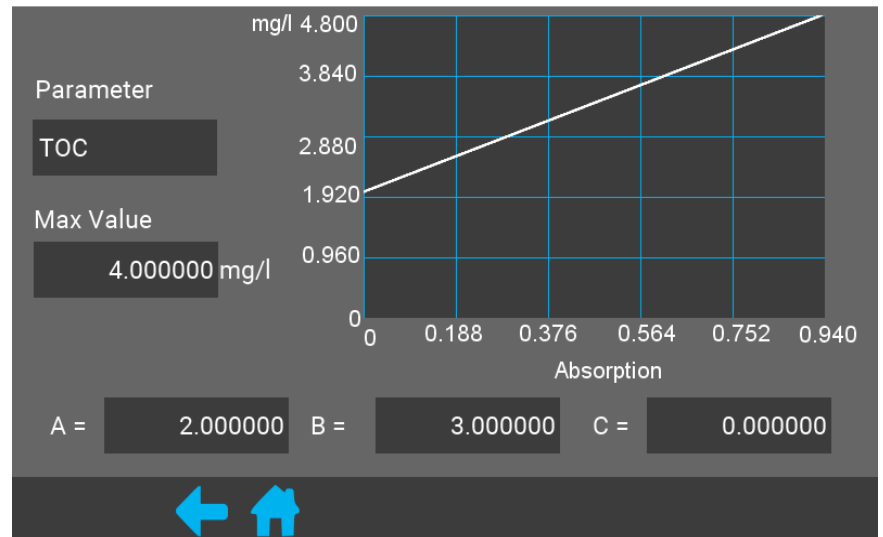
Click complete to save the calibration



## 2. View Curve

View Curve

The following graph will be displayed with the current calibration of the parameter selection.



## 3. Entering an Equation

Enter Equation

For calibration of parameters where the concentration is not known until a later date such as the measurement of **BOD 5-Day**. We must measure the water on the Go! and record the values. On the sampling day, before the concentration from the primary device is known.

Once the concentration is discovered from the primary device. They can then be plotted in Excel and the coefficients found for the relationship. Finally, the coefficients can be entered onto the **GO!** The following steps describe this process.

## Example: Calibrate 5-Day BOD Test

To calibrate BOD on the Photonic Measurements, GO! we recommend using BOD five-day test.

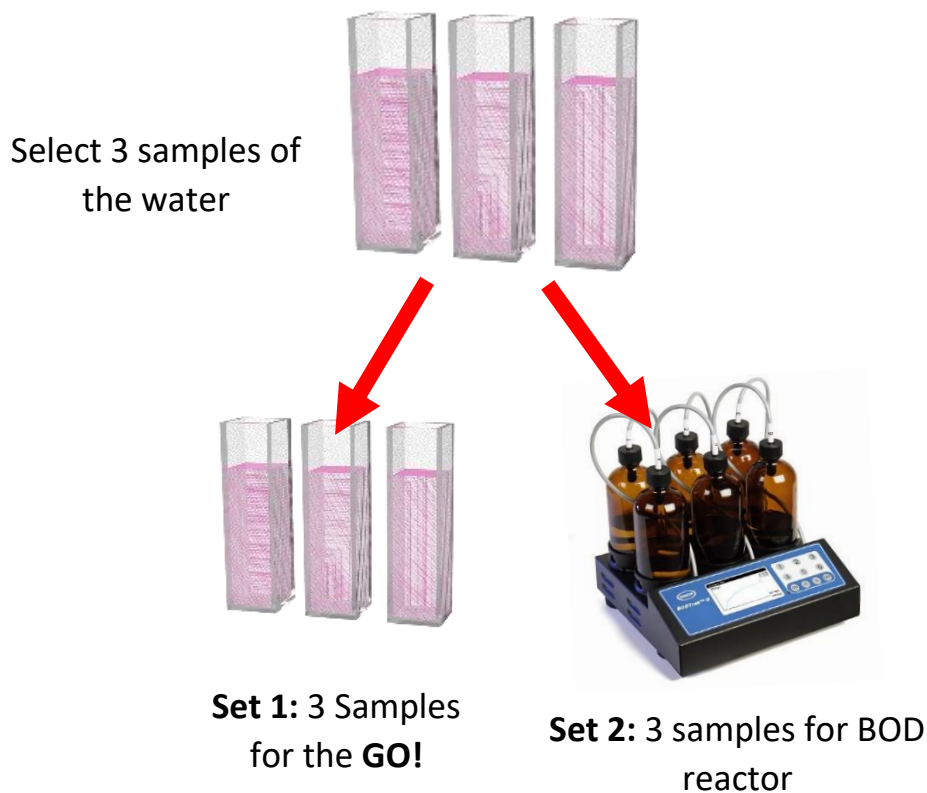
Take at least **3 samples** of the water and divide them into two.

**Set 1:** one of each for the **GO!**

**Set 2:** one each for the **five-day BOD** test.

(Three samples are needed to obtain enough statistical data to perform a calibration accurately.)

Ensure the samples are labelled to ensure the measurements from each sample can be correlated correctly.



## Measure BOD 5-Day

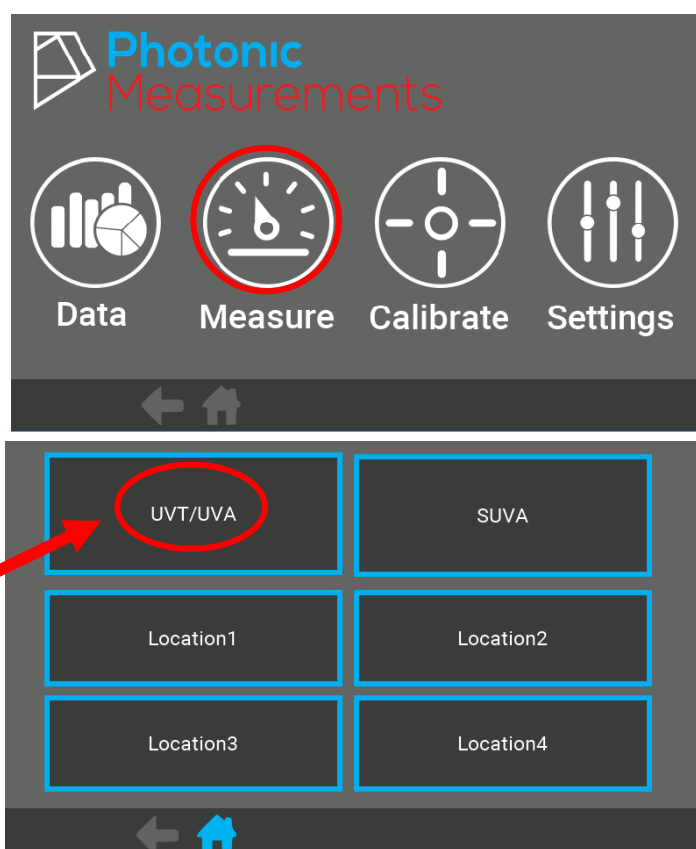
Perform the measurement of **BOD** using the procedure from the manufacturer of the **five-day test**. Once complete write the values into a table like so:

Sample Name	Value mg/L
Sample 1	BOD 5 Day measurement
Sample 2	BOD 5 Day measurement
Sample 3	BOD 5 Day measurement

### Measure BOD on GO!

Due to the five days test requirement for **BOD** you will need to measure the absorption of each of the three samples on the day, and then wait for the result to come in from the **BOD five-day test**. The reason we measure on the GO! before the five-day test is to reduce any growth of organic material in the sample. Thus, instead of going to calibration we click on measurement to get the absorption. Start the **GO!**

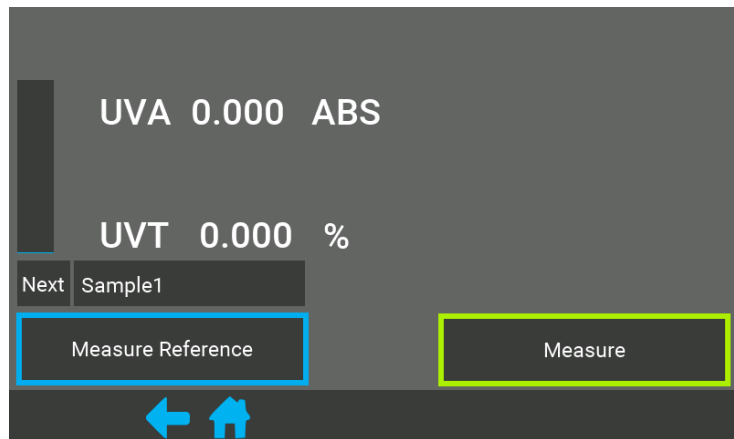
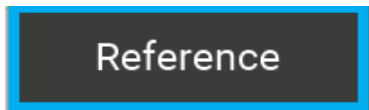
Select the **Measure Screen**



Click on **UVT/UVA** to get an absorption value

Prepare a reference sample of deionised water in a cuvette.

Click **REFERENCE**



Next, Measure Sample 1

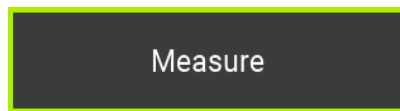
Fill cuvette with sample

It is best to use the same cuvette used to take the **REFERENCE**.

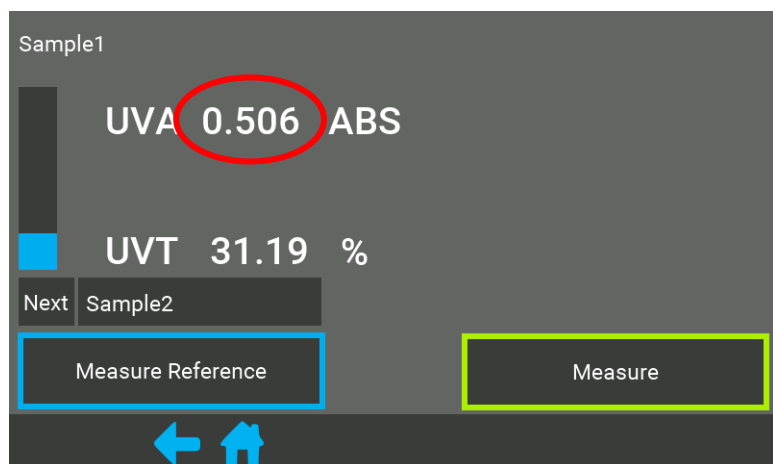
Place a small amount of **Sample 1** into the cell (1/10 off cell height) and gently shake sample in the cuvette and empty.

Lastly, place **Sample 1** into the cuvette (3/4 height) and place into the **GO!**

Click **MEASURE**



Write down the **UVA Value** for Sample 1, as shown below in the table. The value 0.506 is used for example purposes only.



Sample Name	Value ABS
Sample 1	0.506
Sample 2	Enter UVA/Absorption value
Sample 3	Enter UVA/Absorption value

Continue this process for **Sample 2** and **Sample 3**, then record values in the table.

Lastly, when the 5-Day BOD test is complete, record each of the values for example;

Sample Name	Value mg/L
Sample 1	BOD 5 Day measurement
Sample 2	BOD 5 Day measurement
Sample 3	BOD 5 Day measurement

## Calculate the Calibration using Excel

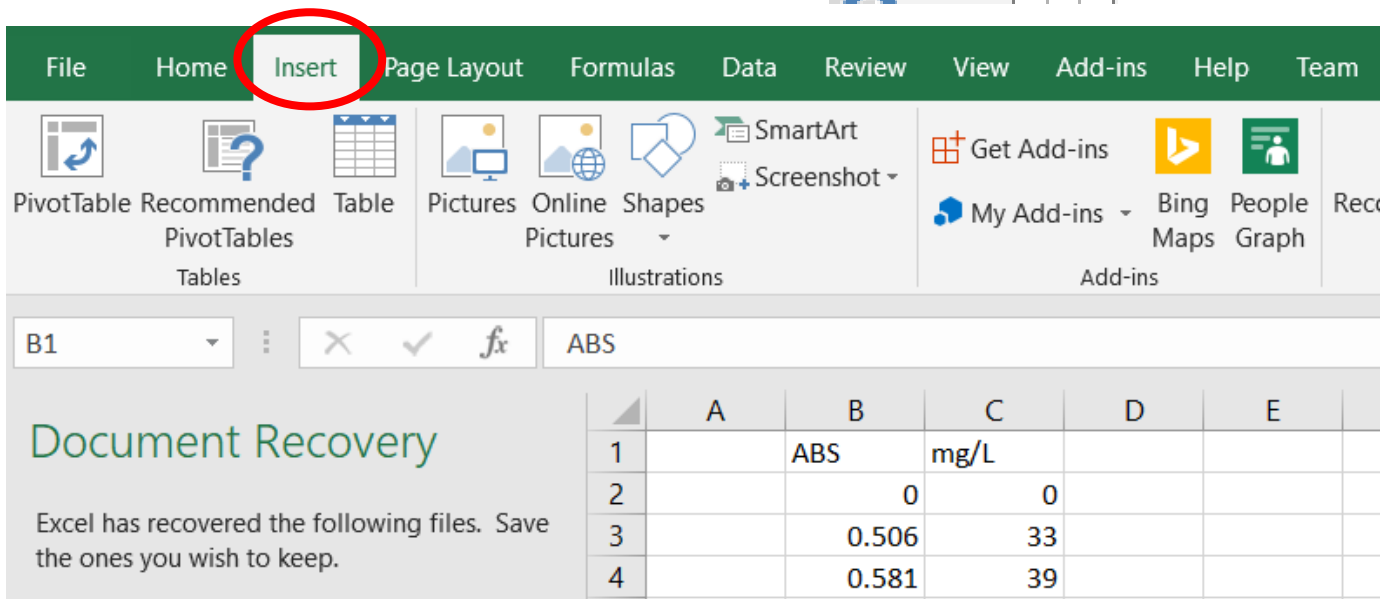
Ensure that you put '0' for both measurements- this will help with creating a straight line.

	B	C
ABS	0	0
	0.506	33
	0.581	39
	0.426	28

Begin by opening a new spreadsheet and enter the data points collected from both the **GO!** and **BOD 5-day** test.

	B	C
ABS	0	0
	0.506	33
	0.581	39
	0.426	28

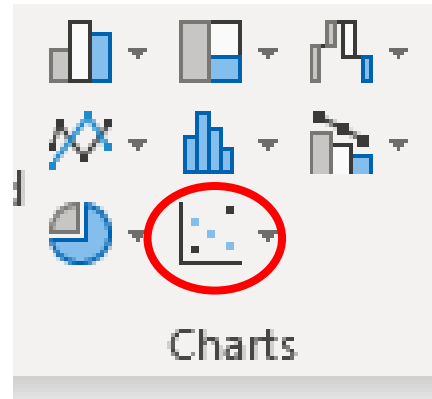
Press **INSERT** on the top menu bar in Excel to display data



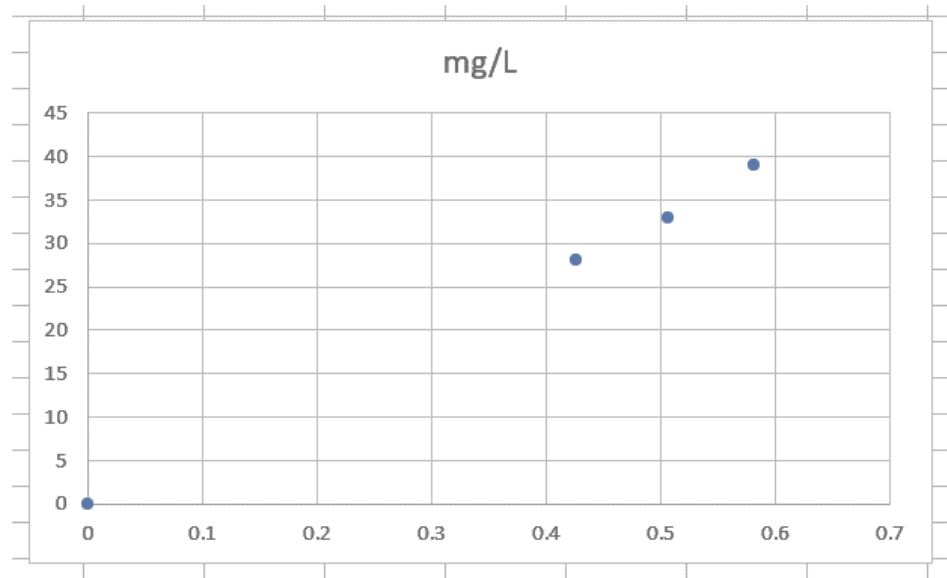
	A	B	C	D	E
1		ABS	mg/L		
2		0	0		
3		0.506	33		
4		0.581	39		



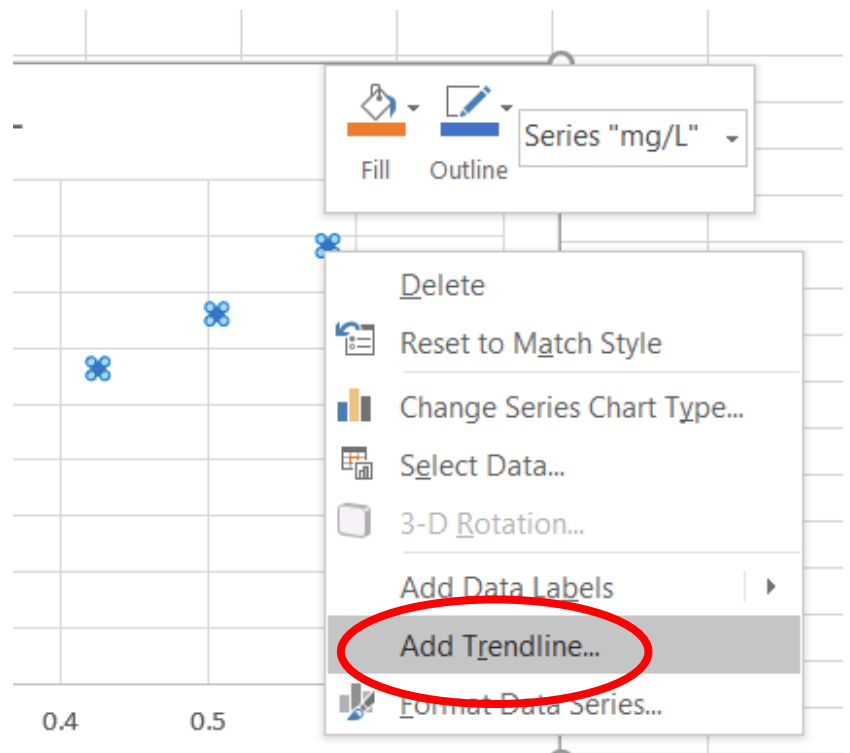
When you press **INSERT** across the menu bar  
click Scatter Graph in Charts



A graph like this one  
will appear



Right click one of the plotted points  
and click on **ADD TRENDLINE**



A panel should appear with the following options, select **linear curve**

Exponential  
**Linear**  
Logarithmic  
Polynomial Order 2  
Power  
Moving Average Period 2

Trendline Name  
**Automatic** Linear (Series1)  
Custom

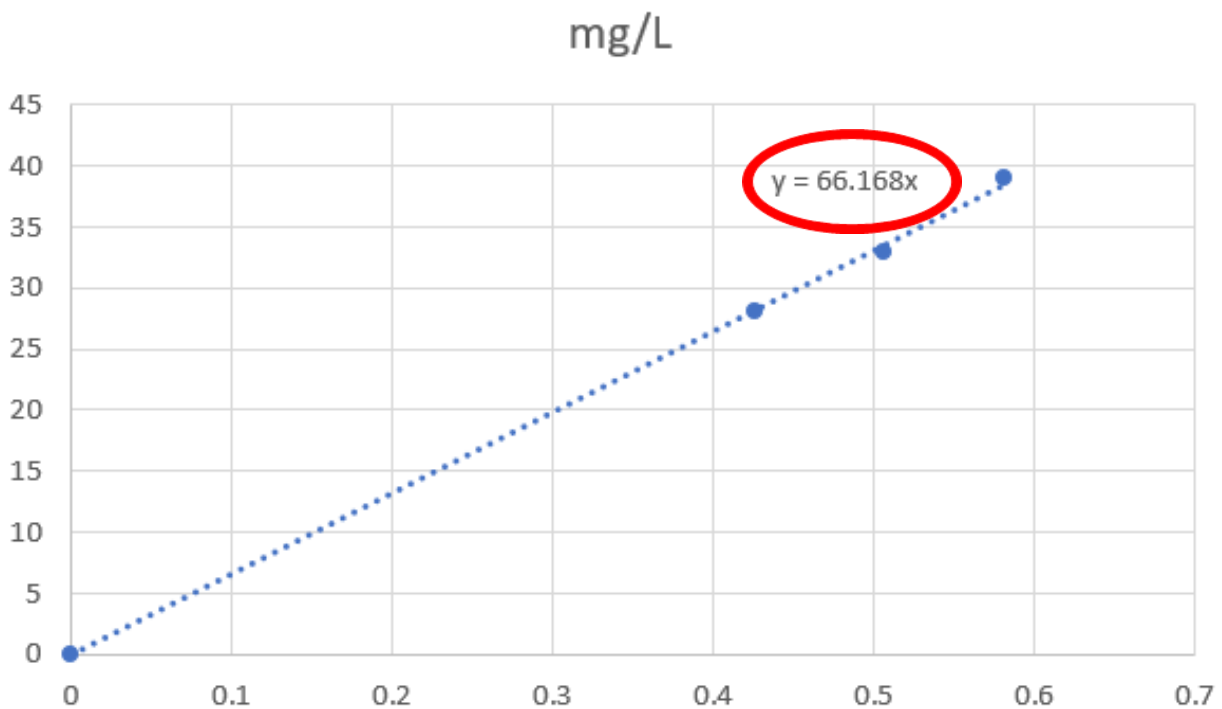
Forecast  
Forward 0.0 periods  
Backward 0.0 periods

**Set Intercept** 0.0  
 **Display Equation on chart**  
 Display R-squared value on chart

Ensure to tick:

**SET INTERCEPT with 0.0 value**

**DISPLAY EQUATION ON CHART**



Input calibration data into the **GO!**

The value displayed will be the **B value** of the equation

$Mg/L = A + (B \times UVA) + (C \times UVA^2)$  where A and C are zero.

The equation then forms the relationship between the UVA measurement of the **GO!** and for example, **BOD five-day** results

Enter in your equation for example

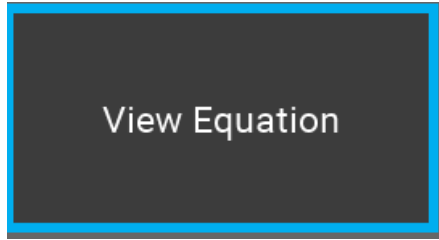
Set A & C to zero and input the value of B found in **excel**

Change the **Max Value** of the measurement.

For example, if all three calibration points fall below what you expect the **max range** to be, then enter the **max range** of your water.

Lastly, to ensure the calibration is stored in the system. Press **SAVE**.

#### 4. View Equation




Your equation will appear in the fields on the screen for the given location and parameter.

Location: Location2      Parameter: TOC

Equation of form:  $Value = A + (B \times Absorption) + (C \times (Absorption)^2)$

A =     B =     C =

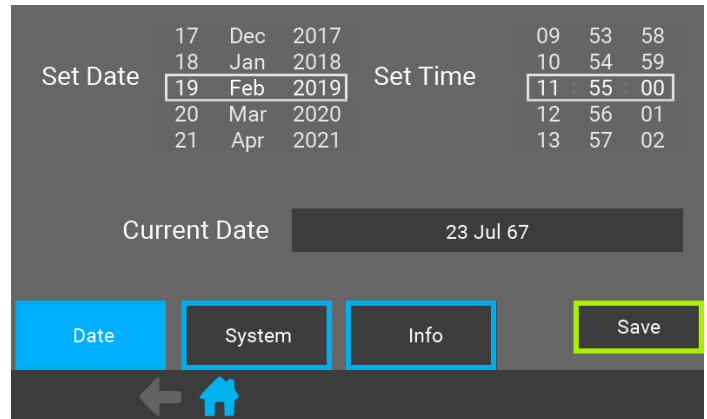
Max Value =  mg/l



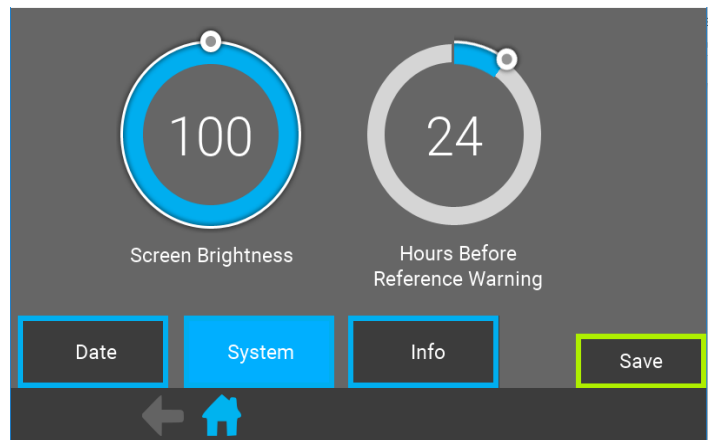
## Settings Menu

Settings Menu will allow you to adjust certain screen preferences on the device.

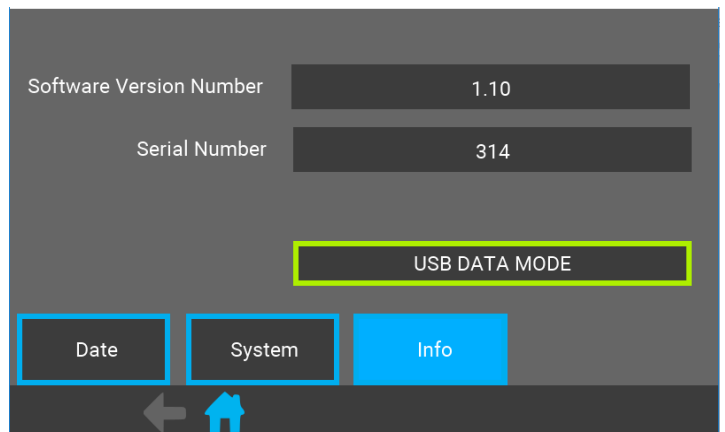
Date and Time, can be found in this section by pressing the date button, simply scroll to find the correct date and press the **SAVE** button



Press **SYSTEM** to adjust screen brightness and hours before reference warning. Managing the brightness will enhance the battery charge.



Information will provide the user with the analyser's software version number and serial number.

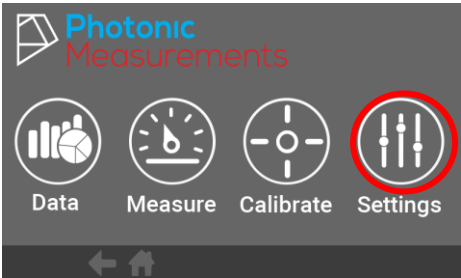


# Data Export

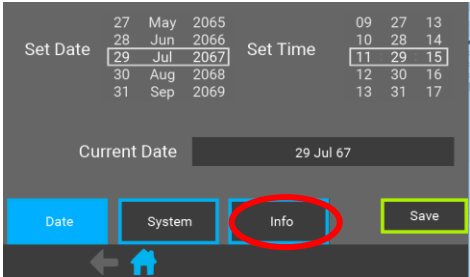
The UV254 GO! can be connected via USB cable to a PC or MAC. The GO! will act like a USB flash drive by simply clicking into Documents on your device where it should appear on the left-hand side of the menu.

Settings > Info > USB Data Mode

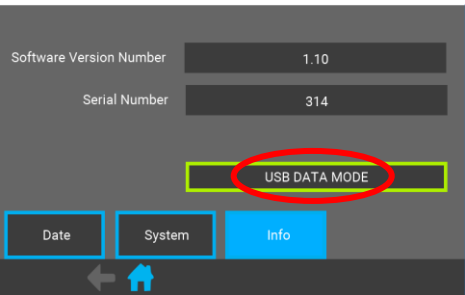
To transfer data to your device, follow these steps: firstly, press to Settings on the **GO!**



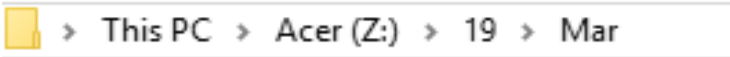
Press Info located at the bottom of the screen



Press **USB DATA MODE** to begin the connection between the GO! and your PC



To access a specific measurement, select the folder starting with the **year** and **month** the measurement was taken.

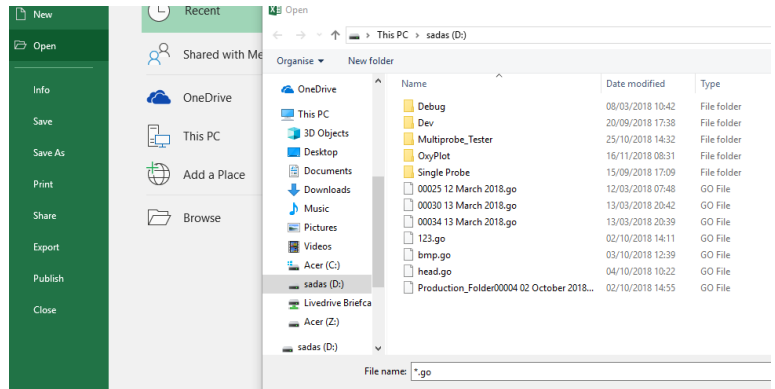


## Access Data \*.GO in Excel

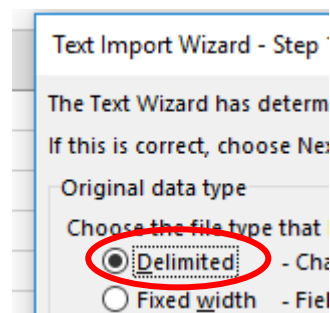
Click **File > Open > Browse > \*.go > Enter**

Type in \*.go as below and click on file.

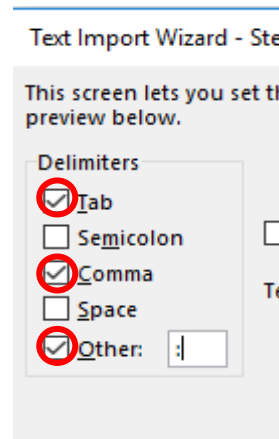
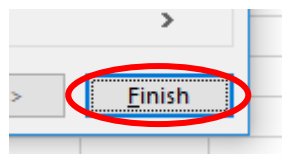
File name:



A menu bar will open complete the steps as follows: press **Delimited**



Then ensure **tab, comma** and **other** with a colon is ticked and press **Finish**



## Care and Maintenance

Contact with water will not disrupt the use of the UV254 GO! it will not damage the internal components. However, ensure that the device is dry before use.

The UV254 GO! can be cleaned with a dust cloth as regularly as possible.

**Sample Cuvette-** should be clean and dry before use. Gently place the Cuvette into the cell chamber on top of the GO! see page 6 for Start Up instructions. Cuvettes should be rinsed with deionised water. If sample cuvette contains frosted sides, ensure that the clear sides are facing the light. This can impair the result if not placed in to the chamber correctly.





# Additional parts



- 1. Charger
- 2. Sample Container
- 3. Battery Bank
- 4. Additional Cuvettes
- 5. USB cable for export data and charging
- 6. Bottles for easy dispensing samples
- 7. Cuvettes

## Battery and Storage



The internal battery is Lithium Polymer it is recommended that the UV254 GO! device be stored in temperatures between 5 and 27 degrees. Precautions should be taken when leaving the device in a car during extreme weather conditions.

## Warranty and Disposal

The UV254 GO! has a 2-year warranty in the incident the product does not operate as specified.

It is important to note upon disposal of the UV254 GO! device – the Lithium Polymer battery must be fully discharged before taking the device to your local recycling facility.

# Glossary

## **Total Organic Carbon (TOC)**

(DOC + Suspended Organic Carbon = TOC)

TOC can come from a range of sources such as decaying natural organic material (NOM) and synthetic sources for example industrial chemicals. NOMs can react with chlorine and as a result can combine to cause harmful by-products

## **Dissolved Organic Carbon (DOC)**

Part of TOC found in the water. It is the part that combines with chlorine to cause harmful by-products. DOC acts as a food source for bacterial and other microorganisms.

## **Biochemical Oxygen Demand (BOD)**

A measurement of the amount of dissolved oxygen that is needed for aerobic biological organisms in a volume of water to breakdown the amount of organic material at a given temperature over a certain time period. This can be tested using the BOD 5-day test. For water being returned to the environment, the level of BOD is important to maintain aquatic life. Too low- there will be a lack of oxygen and too high- can result in suffocation of aquatic life.

## **Chemical Oxygen Demand (COD)**

The amount of oxygen consumed over a given volume of given in mg/L. COD is different in that COD is the organic compounds that can be chemically oxidised.

## **Ultraviolet Transmission (UVT)**

UVT is the measurement of UV energy at a wavelength or frequency which is transmitted through water

## **Ultraviolet Absorption (UVA)**

UVA is the measurement of light that is absorbed by the sample.

## **Specific Ultraviolet Absorption (SUVA)**

Provides a measurement in relation to EPA415.3 DOC Input from another device will be required for this method.

## **Coagulation**

The action or process of a liquid, changing to a solid or semi-solid state. The coagulation process helps with the reduction of organic material that can cause disinfection by-products.

## **Surrogate**

Measurement of NOMS

# Appendices

## Appendix 1: What is Absorption

Absorbance is a measure of the amount of light that is absorbed by the sample.

The absorbance **value A = 2 - log – (T)**

## Appendix 2: Path Lengths

Path length is the distance light travels through a sample within a cuvette. Usually a sample will be made of quartz between 0.1mL to 10mL size.

The absorbance of the water is not only proportional to the concentration of the material being absorbed but also the optical path length of the sample (Beers Law)

Therefore, UVA and UVT measurements must be given for a certain path length. The path length of 10mm/1cm is used and the absorption is reported abs/cm. This can be set to other values if applicable such as abs/m

The UV254 systems are equipped to facilitate different optical paths. The measurement of absorption is converted to abs/cm no matter what size the optical path. The larger the optical path the more sensitive the measurement will be, whereas smaller optical paths are better suited to measuring higher UV254 absorption such as found in waste water applications.

## Appendix 3: TOC Calibration

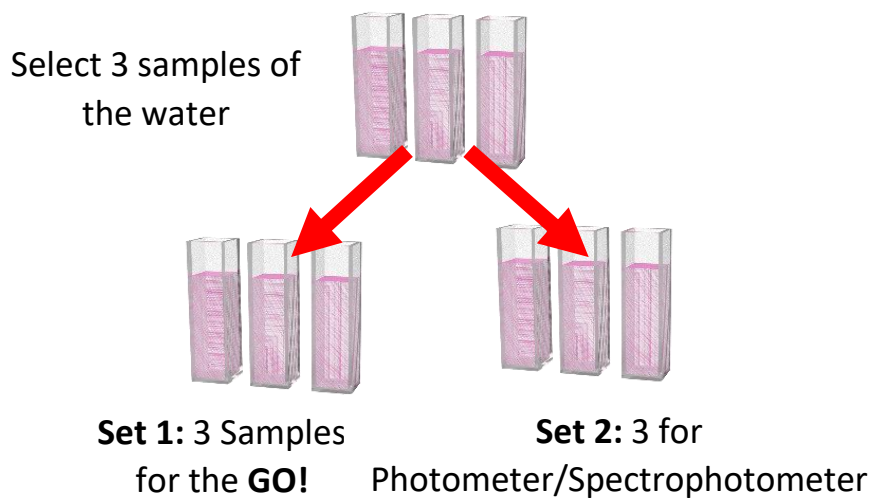
### Tools Needed:

- Photonic Measurement UV254 GO!
- Quartz Cuvette
- Deionised water
- Spectrophotometer or Photometer
- TOC Reagents
- TOC Reagent procedure requirements such as a Block heater.

### How to Calibrate TOC:

Firstly, it is recommended using TOC reagents and Photometer from manufactures such as Lovibond and Hach.

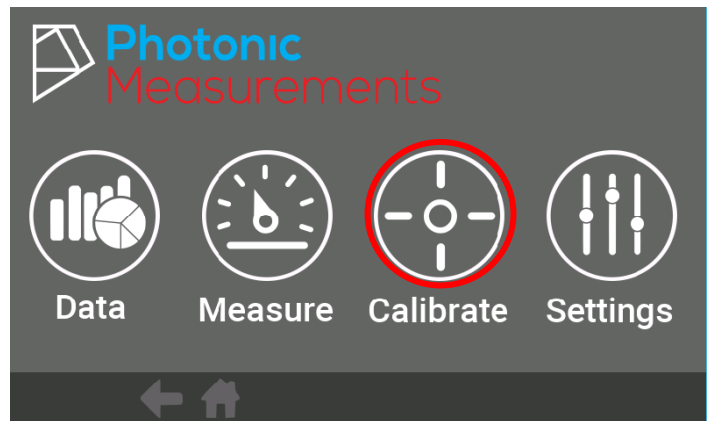
Take at least 3 samples of the water and split into two. Like so:



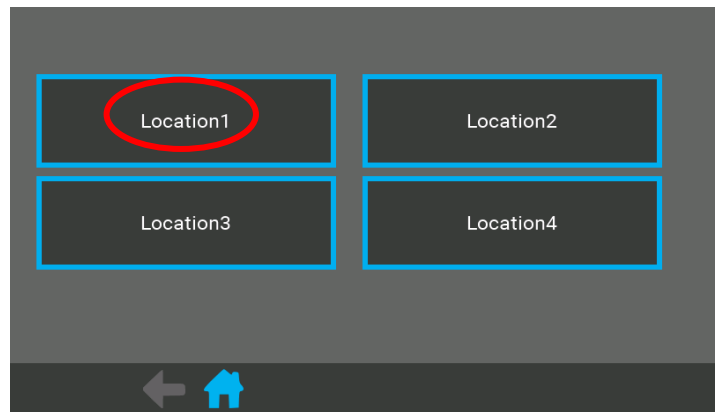
Perform the measurement of TOC using the procedure from the TOC reagent manufacture. Enter the results for each sample in a table for example:

Sample Name	Value mg/L
Sample 1	Enter Photometer measurement here
Sample 2	Enter Photometer measurement here
Sample 3	Enter Photometer measurement here

Start the GO! by using the switch on the back of the device. Press **Calibrate**

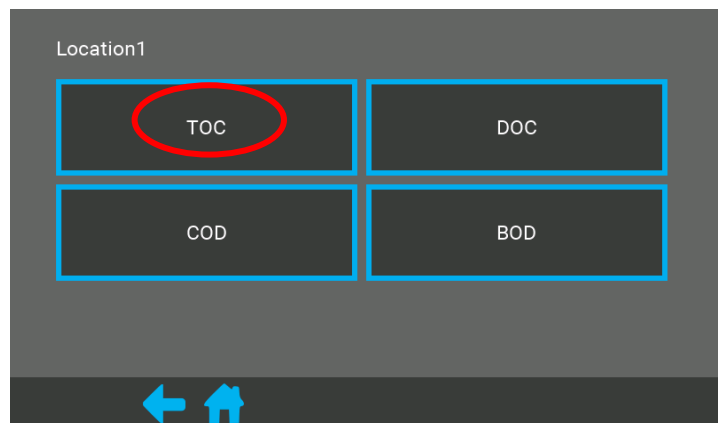


Select a location where you will store the calibration on for example **Location1**



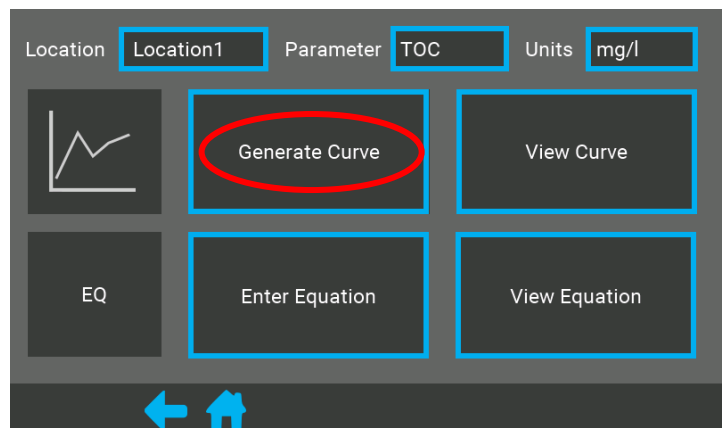
Each Location can save up to 4 calibrations. In total 16 calibrations can be saved on the GO!

Select a **Parameter** for example **TOC**



On the top of the screen you can change the location, parameter or units name. Simply click on the blue box and enter your updates.

Once complete, select **GENERATE CURVE**

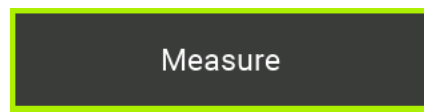


Prepare a reference sample of deionised water into a cuvette

Then, click the **REFERENCE** button



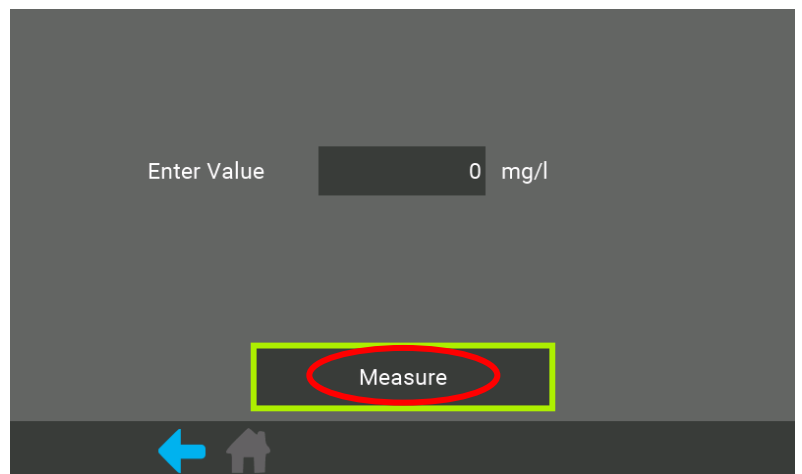
Keep the deionised water reference sample in the GO! and then click **MEASURE**



Enter the value in the box (mg/L) for the sample.

The reference sample will remain at 0mg/L

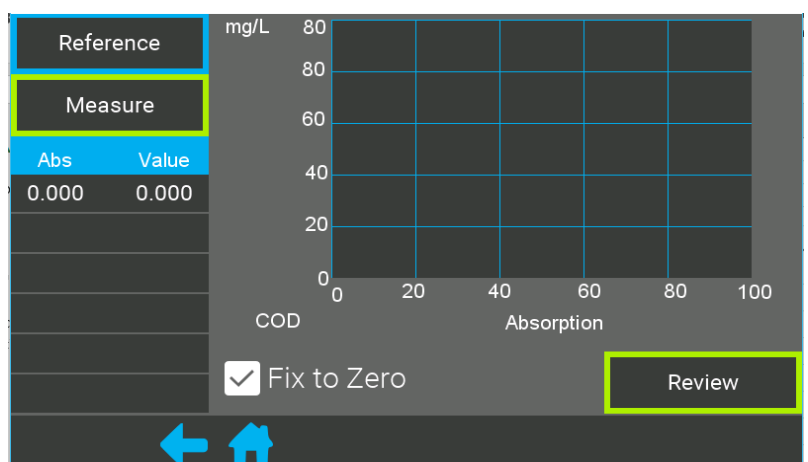
When the value has been entered press **MEASURE**



Next, measure **sample 1**.

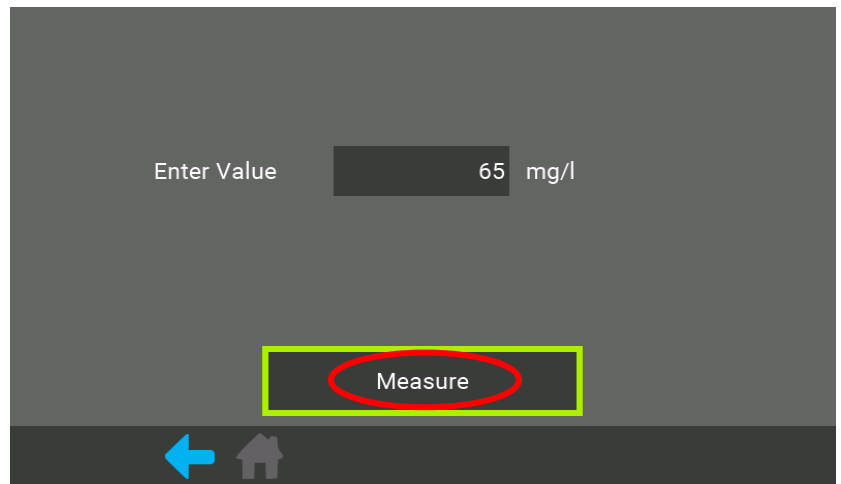
Reuse the same cuvette used to take reference. Place a small amount of sample 1 into the cuvette, 1/10 off cuvette height and then gently shake the contents within the cuvette and **EMPTY**.

Continue the same process with 3/4 off cuvette height and place into the **GO!**



Click measure and then enter the value for sample 1. For example, if sample 1 was 65mg/L from the photometer enter it in the box show below.

Continue this process for sample 2 and sample 3.



Three points will appear on the graph along with the point at 0.0mg/L from the reference.

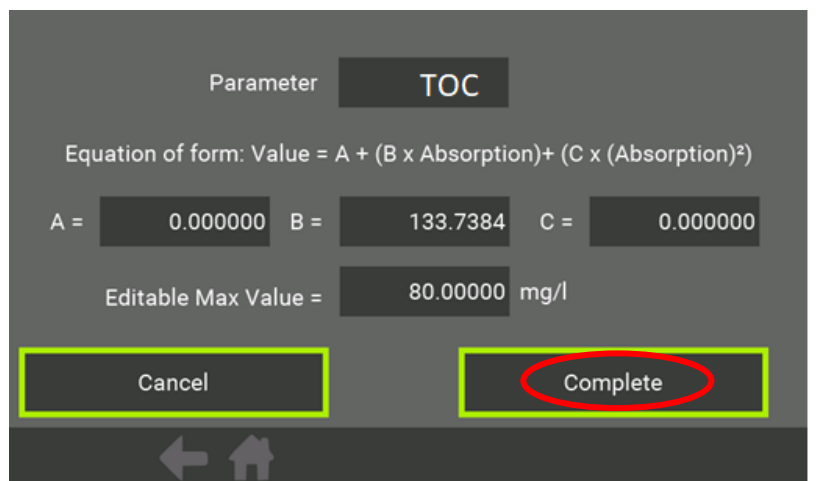
Once all calibration points have been measured click on **REVIEW**



Edit the **MAX VALUE** of the measurement. For example, if the three calibration points fall below what you expect the **MAX RANGE** to be, then enter the **MAX RANGE** of your water.

For example, 400mg/L

Lastly, press **COMPLETE** to store your calibration.





## Appendix 4: DOC Calibration

Follow a similar procedure to that of TOC in the previous appendix

## Appendix 5: SUVA Measurement

Environmental agencies such as the EPA (method 415.3) use specific UV absorbance (SUVA) as a measurement for determining the disinfection by-product (DBP). The measurement is the ratio of absorption of UV254 to the dissolved organic carbon (DOC) concentration. The larger the SUVA the more of the total organic material is made up of aromatic organics. Aromatic organics are highly reactive with disinfectants and thus level of aromatics will greatly increase the risk of DBPs.

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