1st October 18

UV254 Go! Measurement and Calibration of BOD against the BOD five day test

Tools Needed

- Photonic Measurements UV254 Go!
- Quartz Cuvettes
- Distilled water
- BOD 5day testing system such as BODTrak 2 manometric respirometer by HACH
- Microsoft Excel or equivalent

Benefits to the UV254 Go! for COD

- Benefits include
- Time, no waiting around for lengthy five-day BOD Test
- Cost, do not have to pay for reagents and disposal of chemicals
- Waste, no nasty reagents to safely dispose

Why is Calibration Needed?

The UV254 Go measures the change in absorption in the UV part of the light spectra at a wavelength of 254nm. The absorption at this wavelength trends with the amount of BOD in the sample. The UV254 is also sensitive to other chemicals in the sample such as organic material, that means the trend in UV254 signal is dependent on multiple components within the sample being measured.

Importantly though, as the chemical make-up of the water changes so does the percentage of species that make up the complete UV254 response.

Thus, it is important to calibrate the UV254 device on a regular basis to account for changes in the chemical make-up of the water.

When to Calibrate

The UV254 Go can save calibrations at four different sampling locations. This reduces the need to re-calibrate the system for different locations in which the water may have different chemical make-ups.

1. Routinely calibrated the system weekly/monthly. Depending on local laboratory procedures and changes in water chemistry

2. Location of the samples has not been previously calibrated

3. Seasonal changes. Is there more organic material in the water due to higher temperatures or flood

4. Unexpected spikes in the data being measured

How to calibrate

To calibrate BOD on the Photonic Measurements Go! we recommend using BOD five-day test. A number of devices such as the BODTrak from HACH can be used to perform this task.

Take at least 3 samples of the water and divide them in two. One of each for the Go! and one each for the five-day BOD Test. 3 samples are needed in order to get enough statistical information to perform a calibration. Make sure that the samples are labelled so that measurements from each of the three samples can be correlated.

Split 3 samples into 2 lots

3 Samples for Go!

3 Samples for Photometer/Spectrophotometer
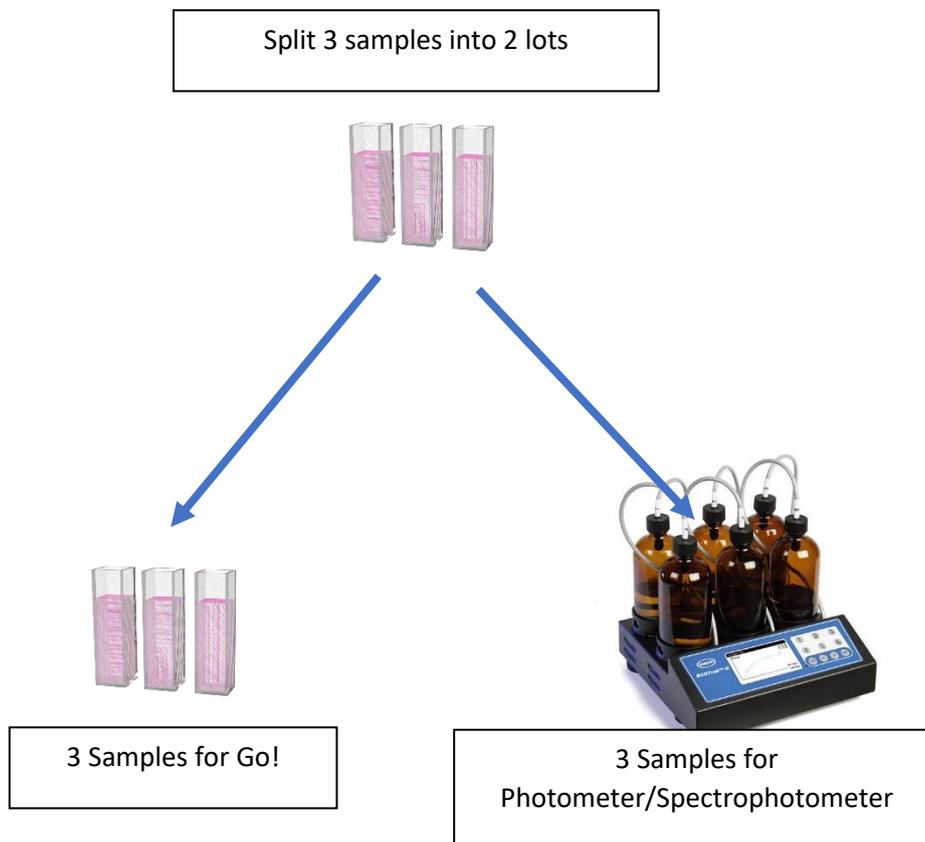
Measure BOD Five-Day

Perform the measurement of BOD using the procedure from the manufacturer of the five-day test. Once complete write the values

Sample Name	Value mg/L
Sample 1	Enter BOD five-day measurement here
Sample 2	Enter BOD five-day measurement here
Sample 3	Enter BOD five-day measurement here

Measure COD 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!
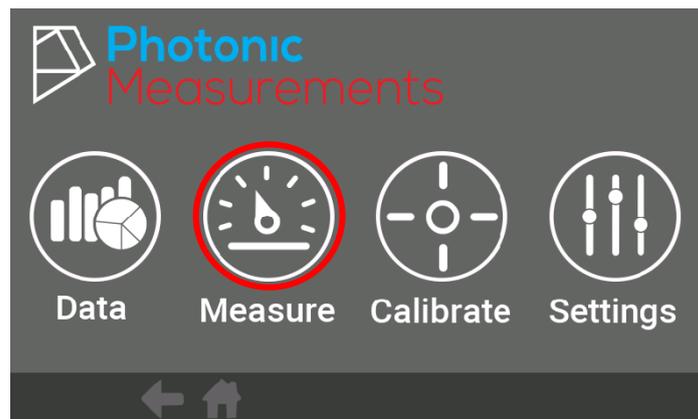
Select the Measure Screen
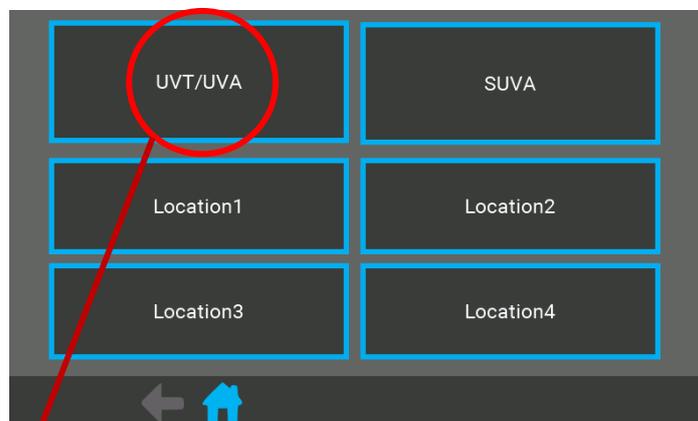
Click on UVT/UVA to get an absorption value
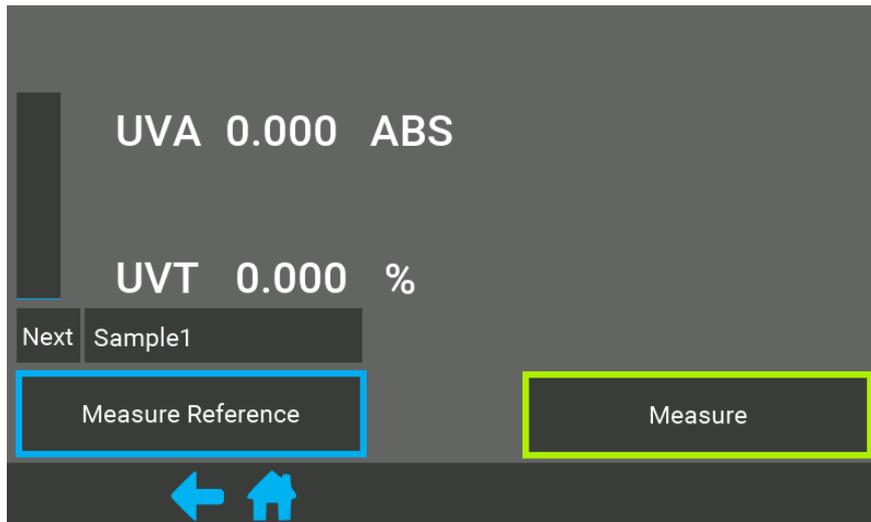
Prepare a reference sample of distilled water in a cuvette.
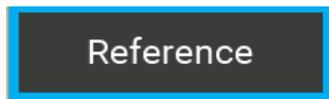
Click on the reference button

Next, lets measure sample 1.

Filling cell/cuvette with sample best practice

The best practice is to reuse the same cuvette/cell as was used in the reference.

Thus, taking the empty the reference cell of the distilled water.

Place a small amount of sample 1 into the cell, 1/10 off cell height and then move sample around in cell, then empty.

Lastly place sample 1 into the cell 3/4 height and place into the Go!
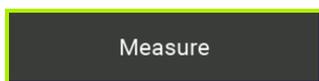
Click measure.
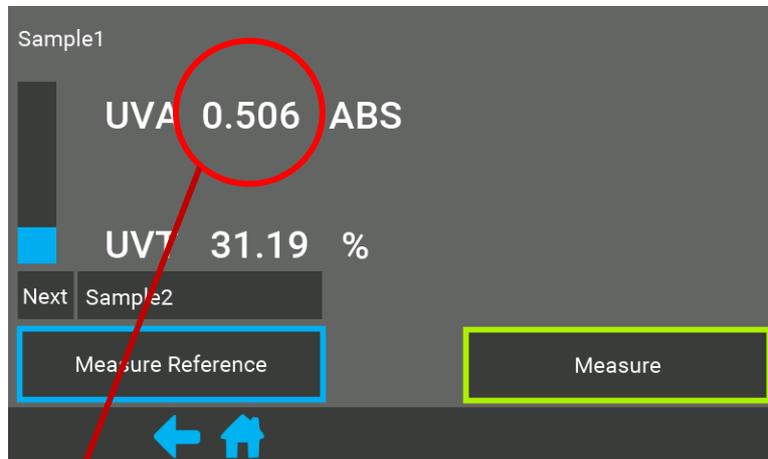
Write down the UVA Value for sample 1, as shown below in the table. The value 0.506 is used for illustrative purposes only.

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

Repeat the measurement for sample 2 and 3 record values

Sample Name	Value ABS
Sample 1	0.506
Sample 2	0.581
Sample 3	0.426

Values in table for illustrative purposes only

Five-day BOD Test Complete

Wait for the five-day BOD test to complete and record each of the values, for example in table below

Sample Name	Value mg/L
Sample 1	33
Sample 2	39
Sample 3	28

Values in table for illustrative purposes only

Calculate the calibration using Excel

Open a new spreadsheet and enter the data points from both the Go! in the left column and the five-day test in the right column. Make sure you put at zero point for both measurements even though this hasn't been measured it will help with the formation of a straight line.

B	C
ABS	mg/L
0	0
0.506	33
0.581	39
0.426	28

Holding down the left mouse button to highlight the data

B	C
ABS	mg/L
0	0
0.506	33
0.581	39
0.426	28
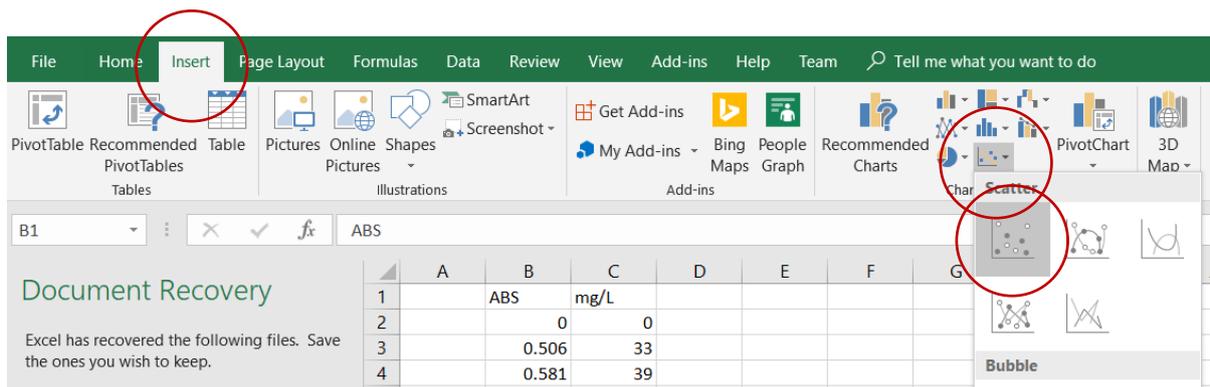
1. To display a graph of the data click on 'Insert'

2. Then on the scatter symbol
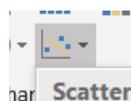
3. Then on the scatter with just points
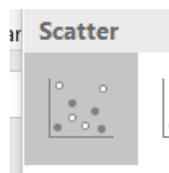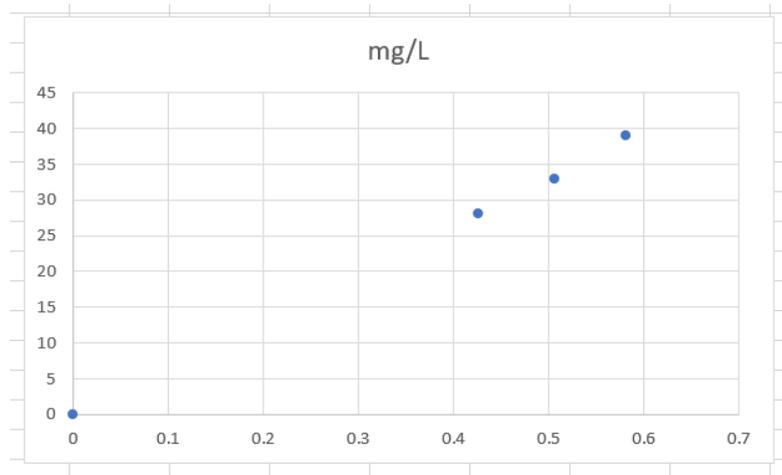
A graph similar to the one above with the UVA/Absorption from the Go! along the X-Axis and mg/L of BOD from the five-day test along the Y-Axis.
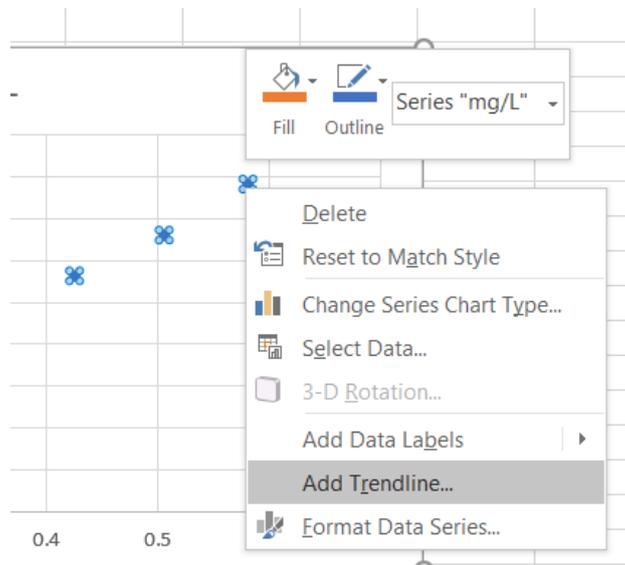
Right click on a data point and the click on 'Add Trendline'.

- On the panel on right should open in excel as shown. If it doesn't select the option to format trendline.

- Select a Liner curve

- Select Set Intercept with a value of 0.0

- Display equation on chart
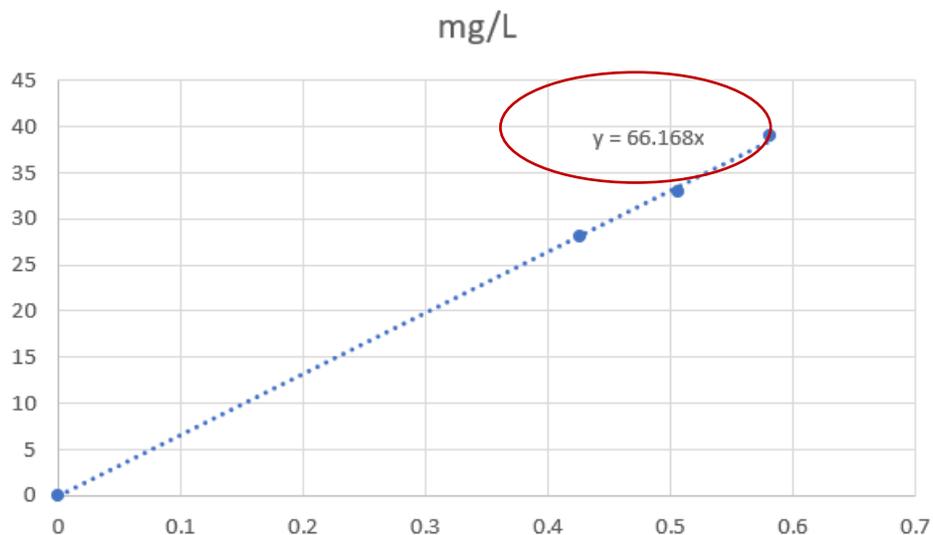
The value given in the display equation will be the B value of the equation

mg/L = A + (B x UVA) + (C x UVA^2)   where A and C are zero.

The equation forms the relationship between the UVA measurement of Go! and the BOD five-day result

Input calibration data into Go!
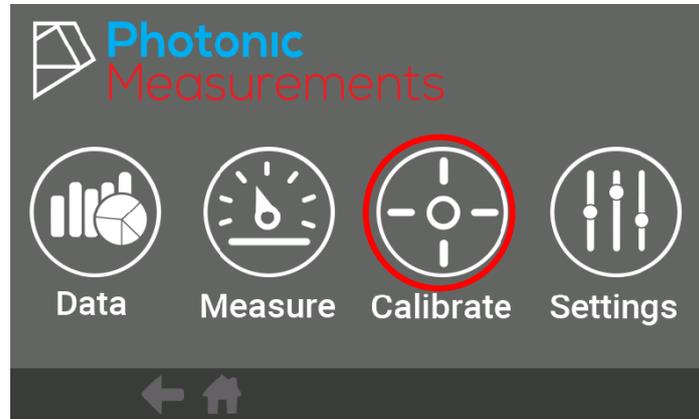
Select the Calibration Screen
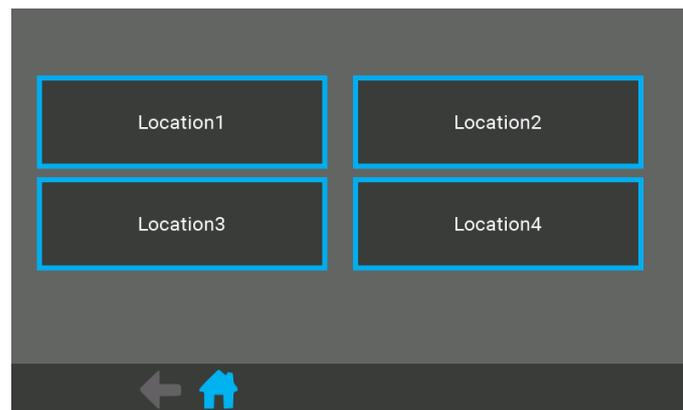
Select a location to store the calibration on, for example location 1

For each location up to 4 calibration can be saved. This allows for a total of 16 calibrations to be saved on each Go!

Another way to look at this, is that the locations can be used to save four different parameters per testing site. As the calibration for example for COD maybe different from one measurement site to the next.
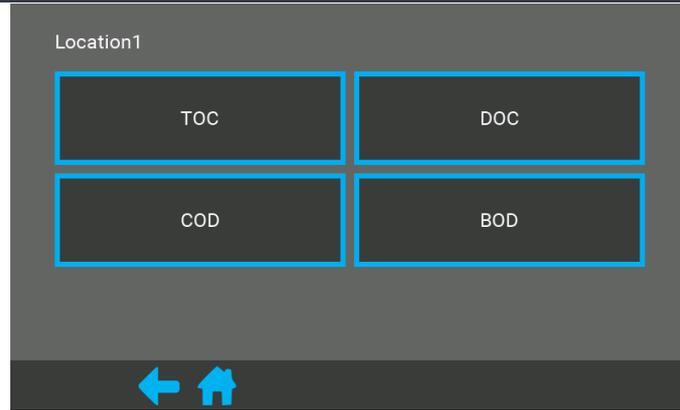
Select the parameter

Don't worry at this stage if the parameter/name is not there for the parameter you want to calibrate this can be edited by selecting a parameter you want to edit
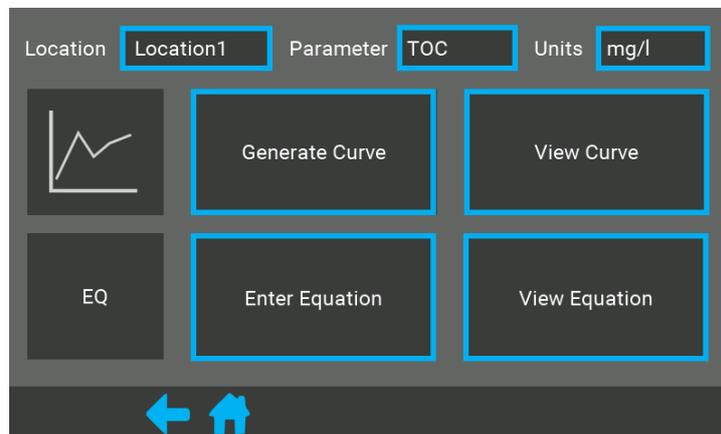
If you need to edit the location, parameter or units name, you can do so by clicking on the blue box for each component.

To carry out the calibration click on **Enter Equation**.

Location: Location1   Parameter: BOD

Equation of form: Value = A + (B x Absorption)+ (C x (Absorption)²)

A =   0.000000   B =   66.1?800   C =   0.000000

Max Value =   400.0000 mg/l

Save   Back

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

Before clicking on Save, change the Max Value of the measurement. For example, if you all three calibration points fall below what you expect the max range to be, then enter the max range of your water. That could be 400mg/L for example.

Lastly, click Save

Save

The calibration will now be stored in the system.

The calibration can be verified by measuring one of the calibrations samples again through the measurement screen. Please see the measurement quick start procedure.