

# UV254 Dip Go!



Issue Date: April 2019

# About Us



## Company Mission

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Photonic Measurements are 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 [www.PhotonicMeasurements.com](http://www.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 Dip 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 Dip 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 Dip Go!

# Introduction

Photonic Measurements' UV254 Dip Go! is a light-weight, portable device, which allows easy measurement of open channel water with rechargeable Li-ion battery.

- 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 power the device or 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 Dip Go!

## UV254 Dip Go! Start Up Guide



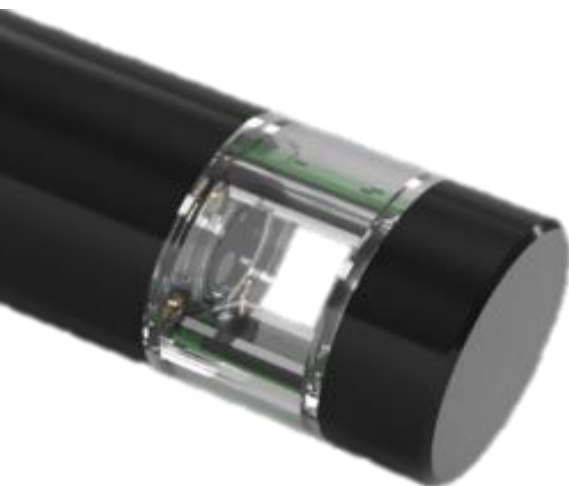
1. Touchscreen Menu
2. On/Off switch
3. USB Charging Port with Cap
4. USB Charging Connection Socket

## Guidelines for Cleaning the Probe

The following steps should be followed to ensure the Dip Go! is used correctly and efficiently to obtain accurate results.



Unscrew light shield to review the probe.

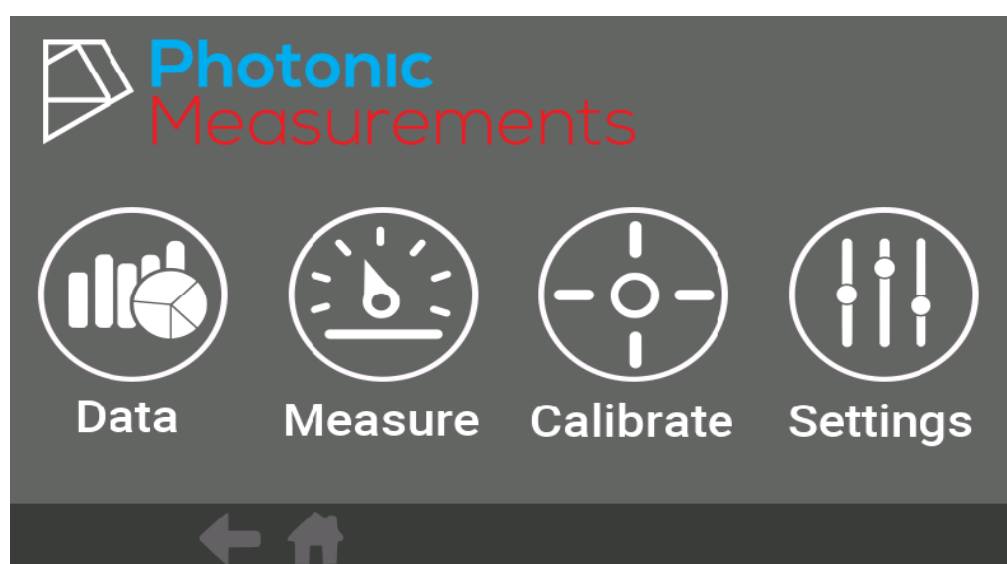


Clean the optical components around the probe.  
(The plastic and glass windows with a damp cloth  
and then dry)



## Menu Screen

The touchscreen menu allows the user to navigate simply through the four main sections of the analyser.



Allows the user to view a collection of past measurement data.



Takes a UVT/UVA reading, various surrogate measurements can also be taken.



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



Adjust time/date, power and brightness to save power.

## Data Menu



Results collected will be stored on the device. Tens of thousands of results can be collected and stored over the lifetime 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.

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

Select

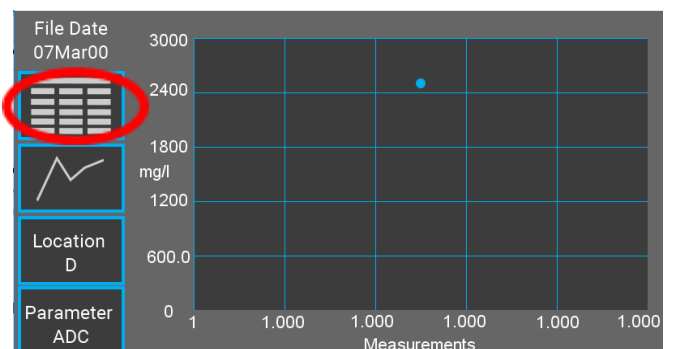
File Date	Sample	Time	Parameter	Value	Units
07Mar00	Sample0	00	ADC	2500.0	mg/l
	Sample1	05:12:00	ABC	1.0	%
	Sample2	05:12:00	ABC	2.0	%
	Sample3	05:12:00	ABC	3.0	%
	Sample4	05:12:00	ABC	4.0	%
	Sample5	05:12:00	ABC	5.0	%
	Sample6	05:12:00	ABC	6.0	%
	Sample7	05:12:00	ABC	7.0	%
	Sample8	05:12:00	ABC	8.0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

File Date	Select Location
07Mar00	All
	D
	A

Location D

File Date	Select Parameter
07Mar00	All
	ADC
	ABC

Parameter ADC



To see a plot of results over a set time period, choose one location and one parameter. Then press the graph icon.

A graph will be displayed.

Press the grid icon to return to the table view of results.

## Measurement Terminology

**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 are a collection of user calibration measurements of parameters/surrogates that relate to UVA on a certain site.

## Measure Menu

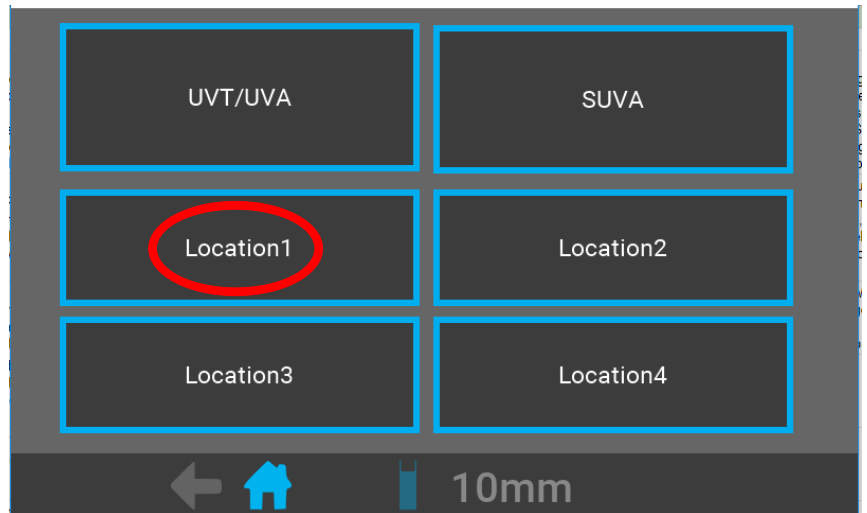


### Step 1:

Begin by selecting the Measurement Routine

In this example,

Location1 is selected



### Step 2:

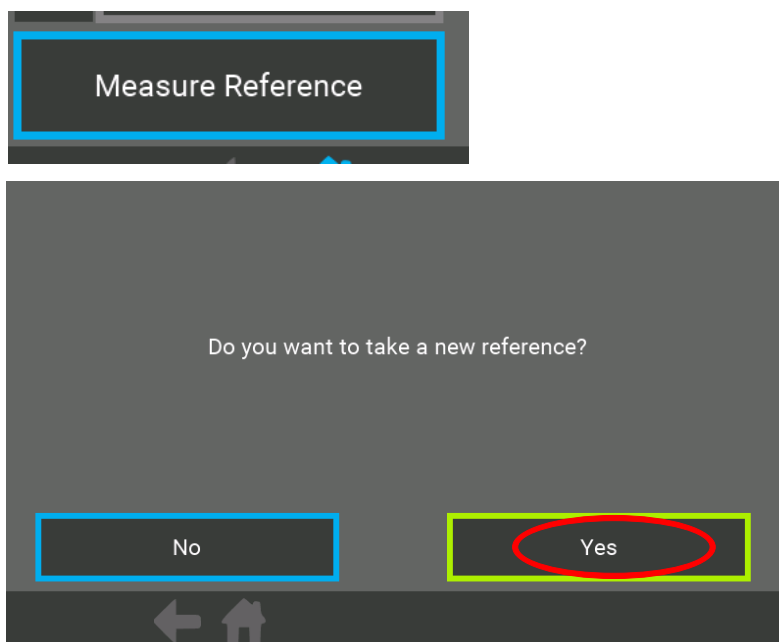
On a regular basis perform a reference measurement.

This can be done by placing the probe/light shield into Deionised water.



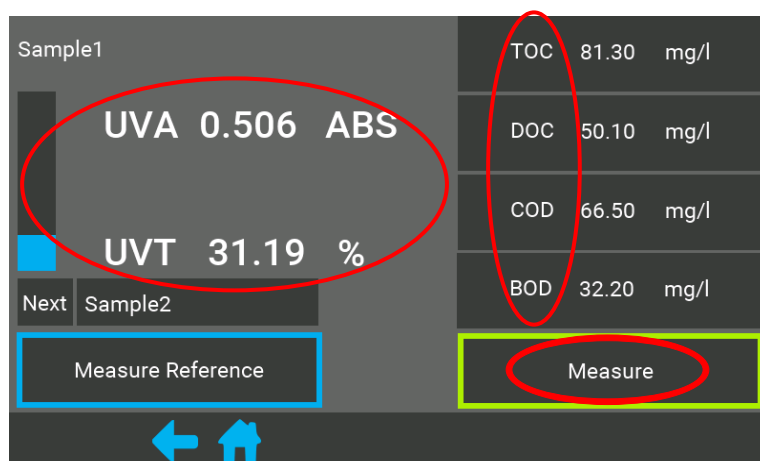
### Step 3:

Click on Measure Reference and then press the Yes Button



### Step 4:

Place the Dip Go! into the sample and press Measure.



UVA/UVT are direct measurements

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

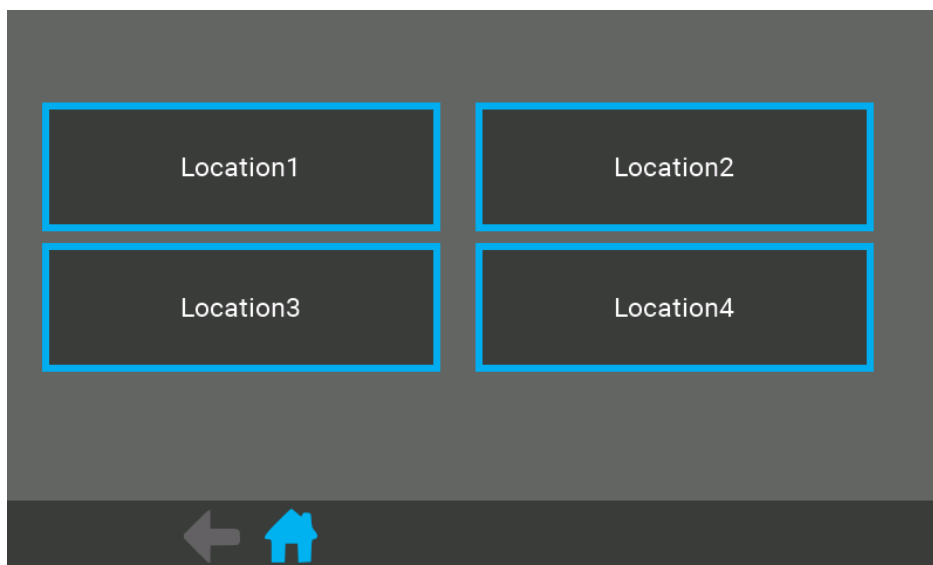
## Calibration Menu



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

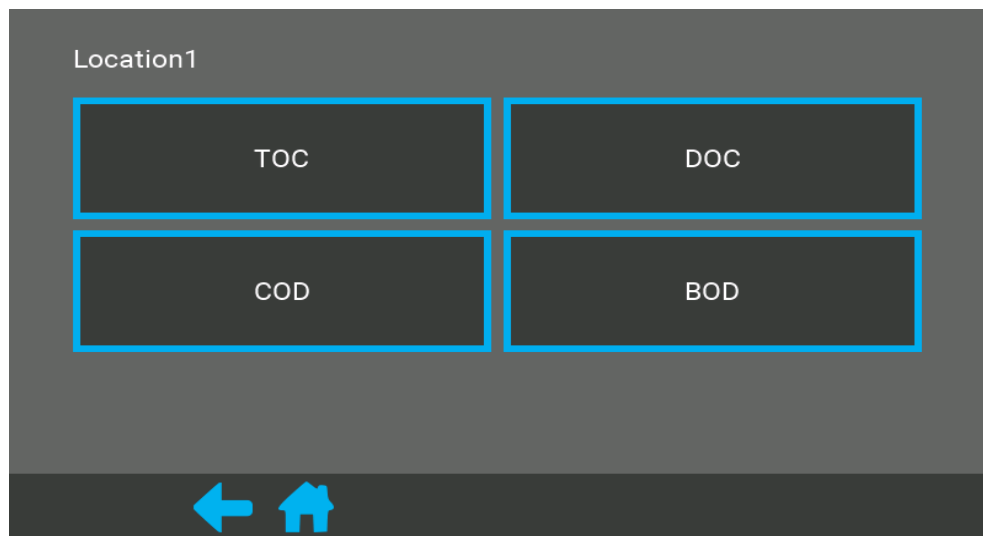
This enables you to store these parameters from different sample points as the response can change from location to location.

Select a location you wish to calibrate; the name of the location 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

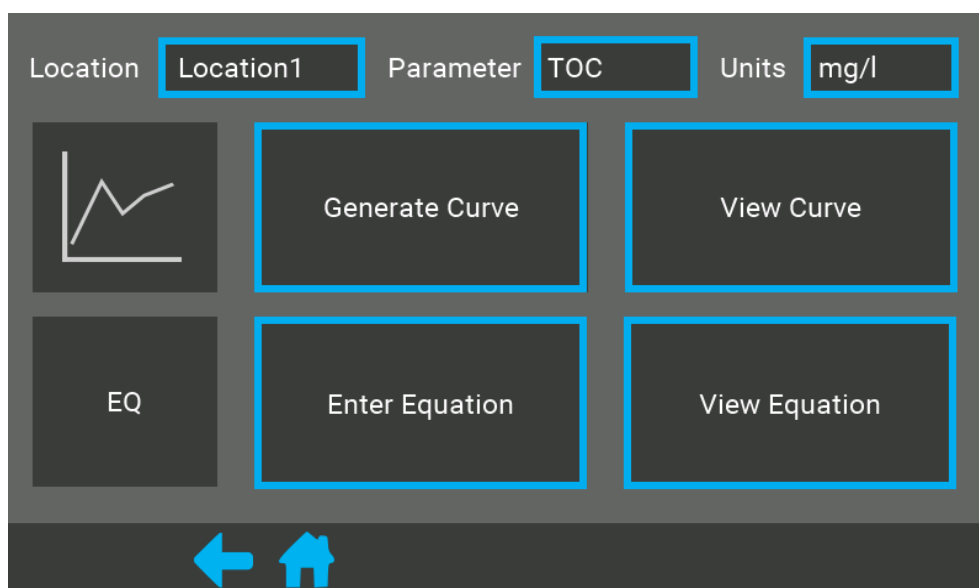


At this stage if the parameter you selected is not there this can easily be adjusted by simply selecting the item you want to change.



This will also apply if you would like to modify location, parameter or units name, simply click on the blue boxes to change each component.

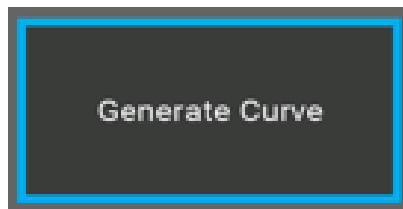
When calibrating, four options will appear on screen like so:



## 1. Generate Curve

### Step 1:

Click Generate Curve

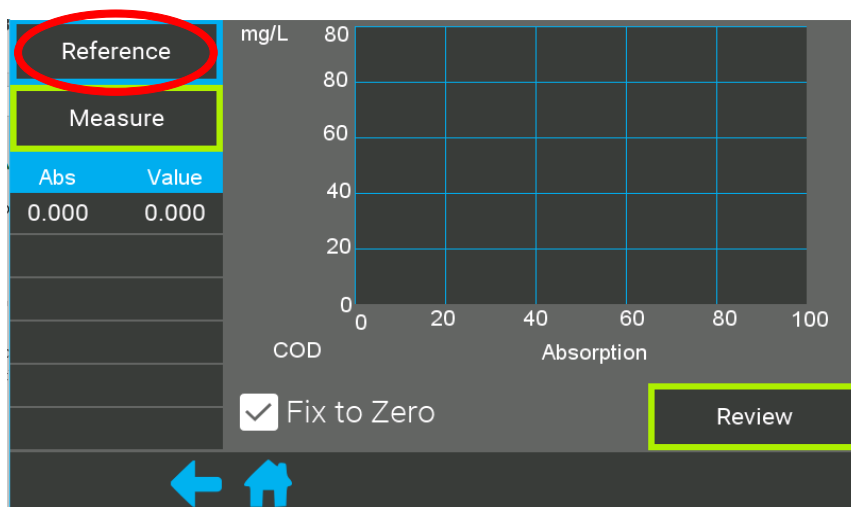


### Step 2:

Prepare a reference sample of deionised water.

Then press Reference

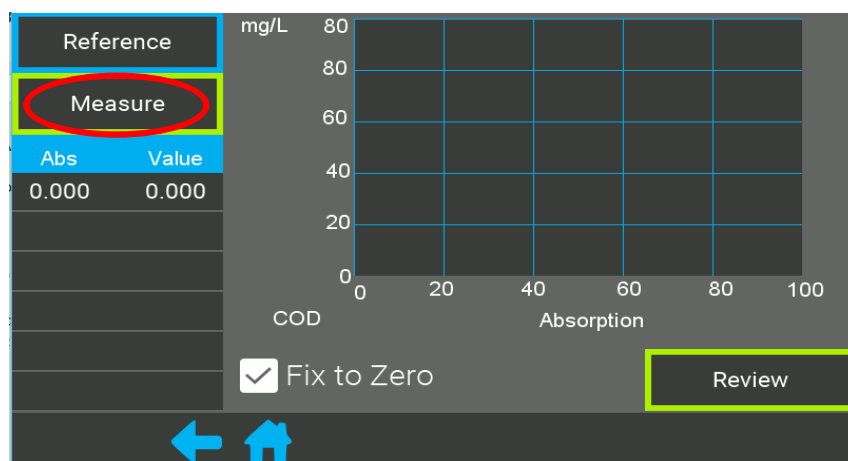
(This will count down 100-0)



### Step 3:

Leave reference sample in the Dip Go! Then press Measure

(This will be the first calibration point)



### Step 4:

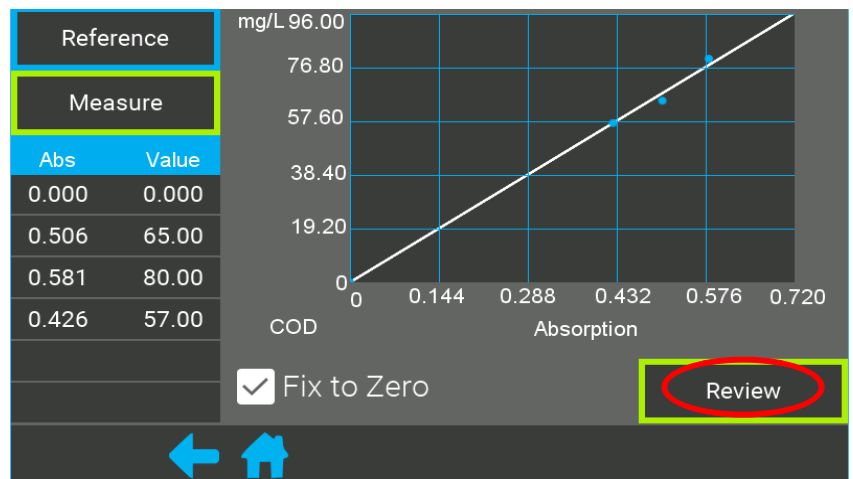
Enter the concentration, for the reference (deionised water) it will be 0mg/L. Press Measure

A screenshot of a device screen showing the input field for the reference concentration. The text "Enter Value" is followed by a text box containing "0 mg/l". Below this is a "Measure" button highlighted with a green border.



### Step 5:

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



### Step 6:

Repeat steps 4 and 5 with other samples of known concentration.

### Step 7:

When you are satisfied with your results from the calibration press Review

Review

**NOTE:** Number of samples will be determined by your own procedure.

### Step 8:

In review check that the maximum value for the calibration is at the top of the expected range

Parameter TOC

Equation of form: Value = A + (B x Absorption) + (C x (Absorption)<sup>2</sup>)

A = 0.000000 B = 70.89125 C = 0.000000

Editable Max Value = 68.00000 mg/l

Cancel Complete

10mm

If you need to change the max value click and enter a new value as necessary

Max Value 90

1 2 3 -

4 5 6 +

7 8 9

0 .

Cancel Complete

10mm

### Step 9:

Click complete to save the calibration

Parameter TOC

Equation of form: Value = A + (B x Absorption) + (C x (Absorption)<sup>2</sup>)

A = 0.000000 B = 70.89125 C = 0.000000

Editable Max Value = 90 mg/l

Cancel Complete

10mm

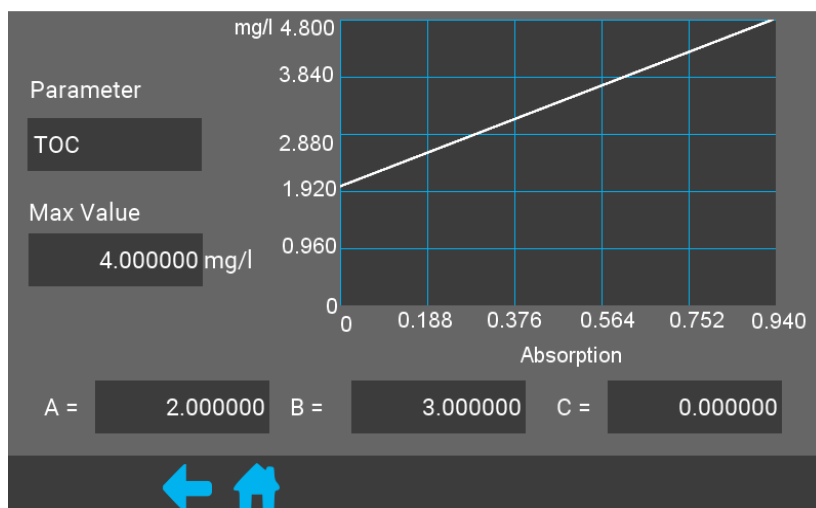
## 2. View Curve

View Curve

The calibration graph will then be displayed.

Constants of the current calibration for the selected parameter are displayed. This is of the form:

$$\text{TOC} = A + B (\text{UVA}) + C (\text{UVA}^2)$$



## 3. Entering an Equation

Enter Equation

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

Once the concentration is obtained from the primary device. They can then be plotted in Excel and the coefficients found for the relationship. Finally, the coefficients can be entered into the Dip Go!

When you get your results calculate your calibration curve. In the form of  $\text{TOC} = A + B (\text{UVA}) + C (\text{UVA}^2)$

An example of this in Excel is shown in Appendix 4.

Sample	UVA	Concentration
1	0.000	
2	0.020	
3	0.604	
4	1.233	

## Input calibration data into the Dip Go!

Enter the calibration calculated:

$$\text{TOC} = A + B (\text{UVA}) + C (\text{UVA}^2)$$

Typically, A and C are zero.

The equation then forms the relationship between the UVA measurement on the Dip Go! for example, BOD five-day results.

Enter in your equation for example

Location: Location1      Parameter: BOD

Equation of form: Value = A + (B x Absorption) + (C x (Absorption)<sup>2</sup>)

A = 0.000000    B = 66.16800    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

Change the Max Value of the measurement. This should be changed to the highest concentration that your calibration will support

To ensure the calibration is stored in the system. Press Save.

Save

#### 4. View Equation

View Equation

Your equation will appear on the screen for the given location and parameter, in the form:



$$\text{TOC} = A + B (\text{UVA}) + C (\text{UVA}^2)$$

Location: Location2      Parameter: TOC

Equation of form: Value = A + (B x Absorption)+ (C x (Absorption)<sup>2</sup>)

A =     B =     C =

Max Value =  mg/l

## Settings Menu



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

### Date and Time

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

### Screen Brightness

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

'Hours Before Reference Warning' simply means after a set time the system will alert you that a reference should be taken.

### Info Button

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

USB DATA MODE

Press the button, to turn the device into a USB drive. This will allow results to be copied to a PC. To use with Excel, use Appendix 5.

## Care and Maintenance

Ensure that the device is dry and free from sample debris before use.

The UV254 Dip Go! should be cleaned with a dust cloth as often as possible.

### Battery and Storage



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

### Warranty and Disposal

The UV254 Dip Go! has a 2-year warranty, subject to use according to the manufacturer's instructions.

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

## Additional Accessories



1. Charger
2. Sample Container
3. Battery Bank
4. USB cable (For exporting data and charging, can be found underneath the controller)



## Ranges for Surrogates

Ranges for the Dip Go! depend on the pathlength of the probe that was selected on purchase. Probes can be swapped out at to match the application, if the user has more than one probe.

### Ranges

Parameter	1mm path length in mg/L	2mm path length in mg/L	5mm path length in mg/L	10mm path length in mg/L	20mm path length in mg/L	50mm path length in mg/L
COD	0-2800	0-1400	0-560	0-280	0-140	0-56
BOD	0-1400	0-700	0-280	0-140	0-70	0-28
TOC	0-1200	0-600	0-240	0-120	0-60	0-24
DOC	0-1000	0-500	0-200	0-100	0-50	0-20

### Accuracy

Parameter	1mm path length in mg/L	2mm path length in mg/L	5mm path length in mg/L	10mm path length in mg/L	20mm path length in mg/L	50mm path length in mg/L
COD	±4	±2	±0.8	±0.4	±0.2	±0.08
BOD	±2	±1	±0.4	±0.2	±0.1	±0.04
TOC	±2	±1	±0.4	±0.2	±0.1	±0.04
DOC	±2	±1	±0.4	±0.2	±0.1	±0.04

# Appendices



A1 – A6

## A1 Specification

Measurements	UVA, UVT and SUVA Surrogate measurements TOC, BOD, COD and others
Range	0-100% UVT 0-2.5 ABS
Accuracy	±0.5% UVT
Repeatability	±0.05% UVT
Path Length	2 to 50mm
Measurement Time	10 Seconds
Power	Internal Lithium Polymer Battery USB Charger
Wavelength	254nm LED and narrow filter photodiode
Light Source	Deep UV LED Long life, self-monitoring
Data Logger	Lifetime measurement storage.
Dimensions	DIP Probe: 95mm (d) 160mm (h) Display Unit: 150x180x77mm
Display	800 x 480-pixel 4in, Capacitive Touch, TFT colour LCD
Operating Conditions	10 to 45 °C, max 80% relative humidity (non-condensing)
Storage Conditions	-20 to 60 °C, max 80% relative humidity (non-condensing)
Enclosure Rating	Display Unit IP65
Probe Material	Plastic (food safe), Aluminium or Stainless Steel
Probe Rating	IP68
Interfaces	USB, Other options upon request
Warranty	2 years
Accessory Options	Cable Extender

## A2 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 chloride 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 set volume 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.

**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.

**Specific Ultraviolet Absorption (SUVA)**

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

**Surrogate**

Is a substitute measurement.

**Absorption**

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

The absorbance value  $A = 2 - \log - (T)$

**Reference Measurement**

A measurement procedure accepted as measurement results appropriate for their intended use in assessing measurement trueness of measured quantity values obtained from other 'measurement procedures' for quantities of the same kind, in calibration, or in describing reference materials.

## A3 Calibrate 5-Day BOD Test

Take at least 3 samples of the water.

Measure the water at three different time periods on the Dip Go!

Collect one sample 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 measurements from each sample can be correlated correctly.

Take three measurements at different time periods with the Dip Go



For each measurement collect a sample for the BOD reactor



3 Collected samples for BOD reactor

## 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:

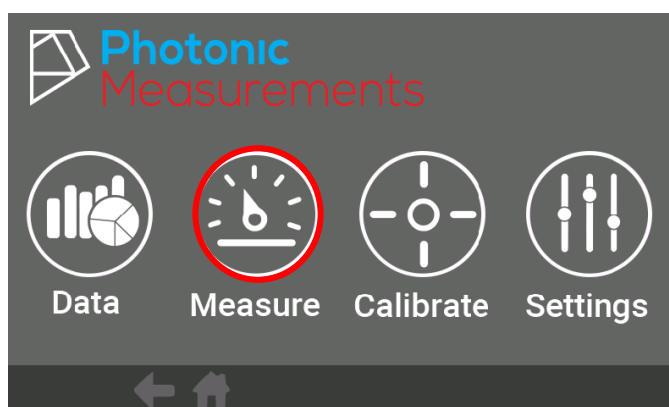
Sample Name	Value mg/L
Sample 1	BOD 5 Day measurement
Sample 2	BOD 5 Day measurement
Sample 3	BOD 5 Day measurement

Measure BOD on Dip Go!

Due to the five-day 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 Dip 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 Dip Go!

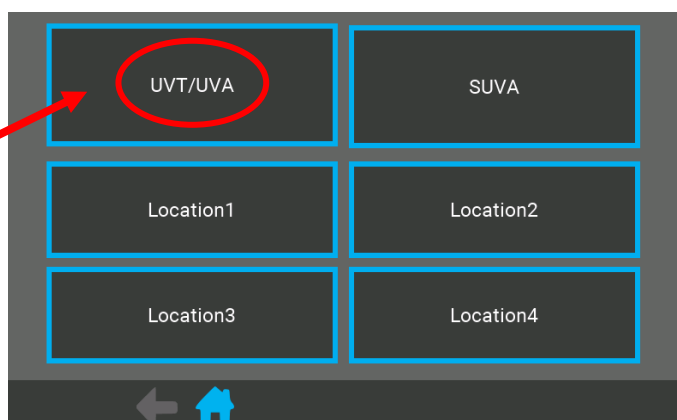
### Step 1:

Select the Measure Screen



### Step 2:

Click on UVT/UVA to get an absorption value



### Measure Sample 1

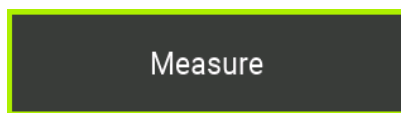
Placing the Dip Go! into the water that is to be measured. Measure the UVA value.

Take sample of water, to be measured with the 5-day BOD.

Repeat in a short time period. For example, 5 minutes until we have 3 measurements and 3 samples.

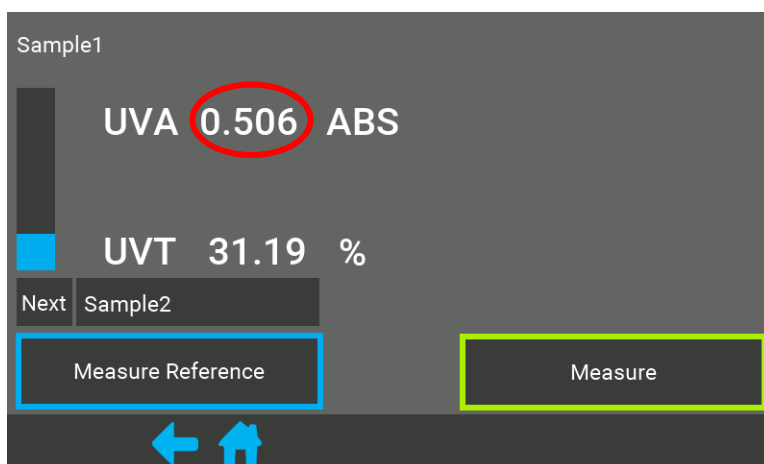
### Step 3:

Click Measure



### Step 4:

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





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.

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

## A4 Calculate the Calibration

### Step 1:

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

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

### Step 2:

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

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

### Step 3:

Press Insert on the top menu bar in Excel to display data



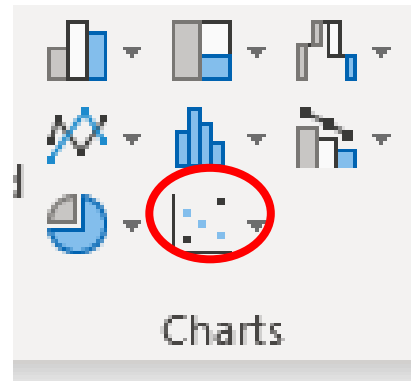
	A	B	C	D	E
1		ABS	mg/L		
2		0	0		
3		0.506	33		
4		0.581	39		

**Document Recovery**

Excel has recovered the following files. Save the ones you wish to keep.

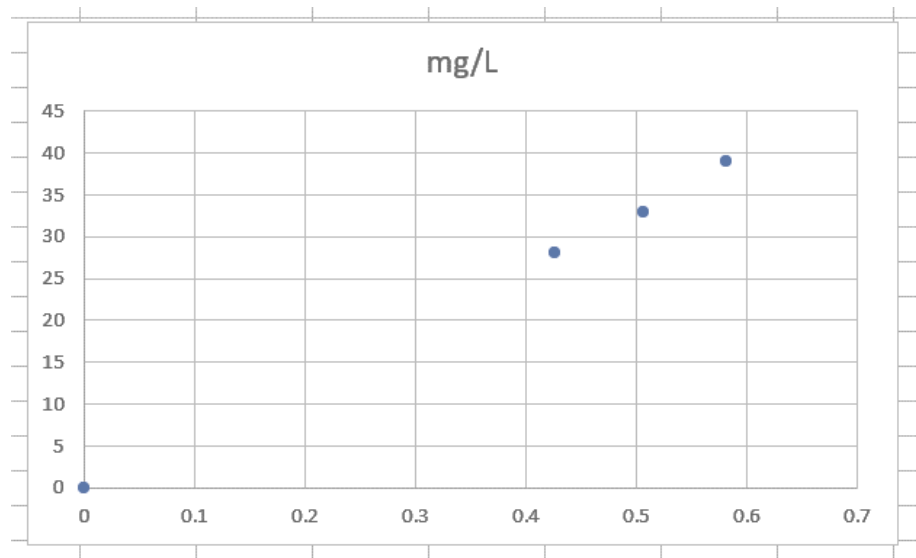
#### Step 4:

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



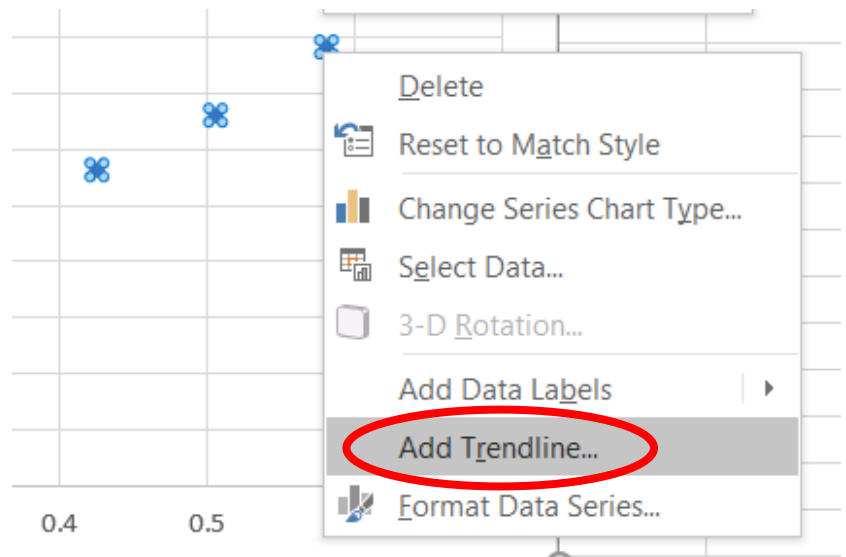
#### Step 5:

A graph like this one  
will appear



#### Step 6:

Right click one of the plotted  
points and click on Add Trendline



### Step 7:

A panel should appear with the following options, select Linear.

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

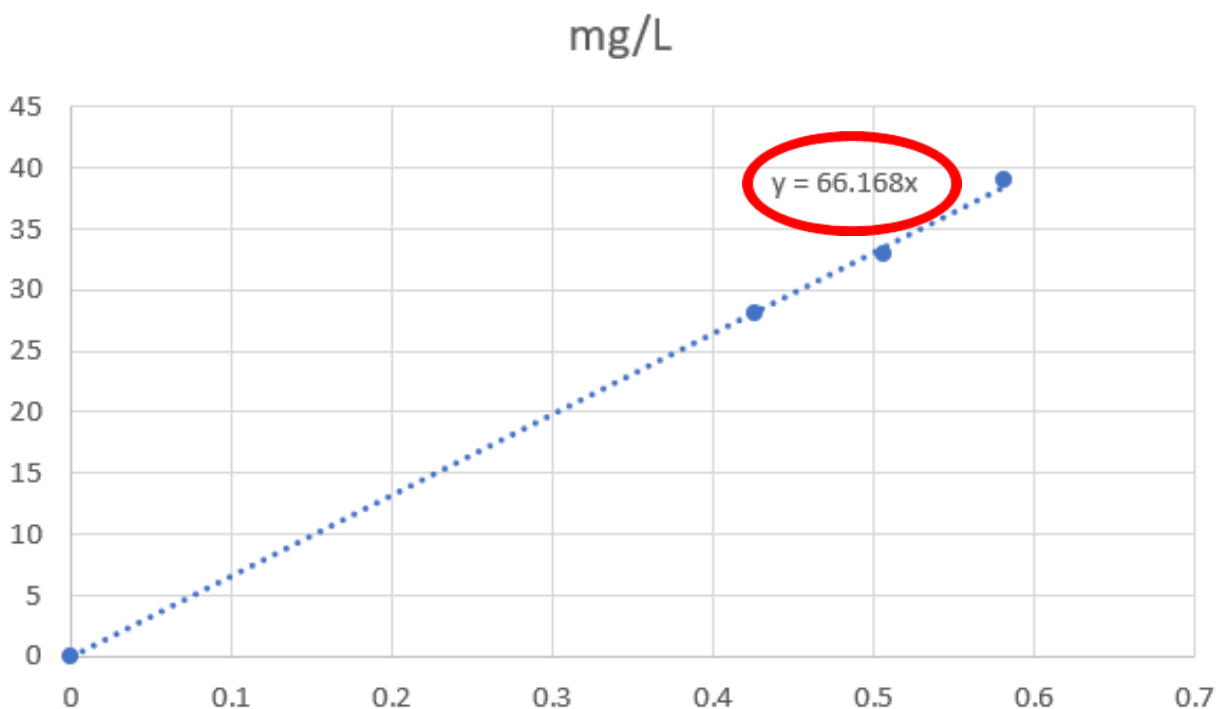
☒ Display Equation on chart

☐ Display R-squared value on chart

### Step 8:

Ensure to tick:

- Set Intercept with 0.0 value
- Display Equation on Chart



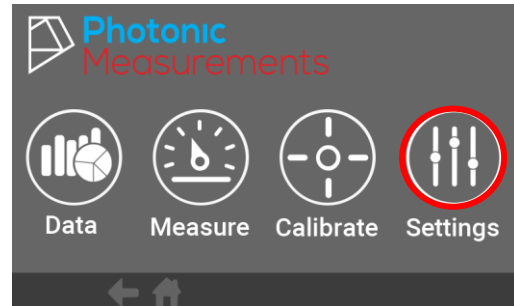
## A5 USB Data Mode

The UV254 Dip Go! can be connected via USB cable to a PC or MAC. The Dip 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

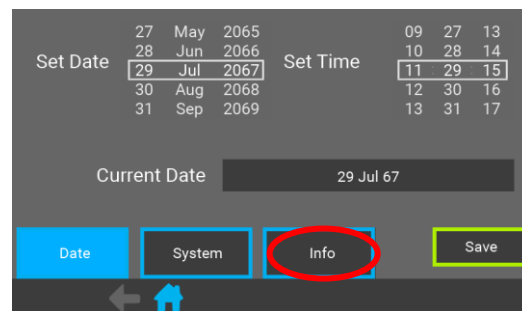
### Step 1:

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



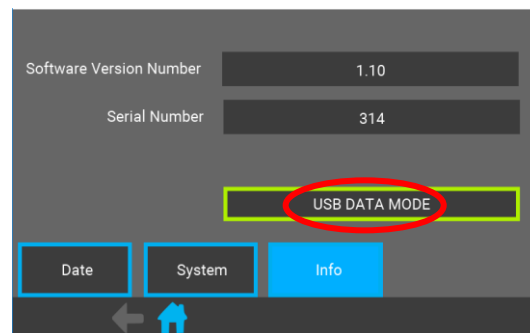
### Step 2:

Press Info button located at the bottom of the screen



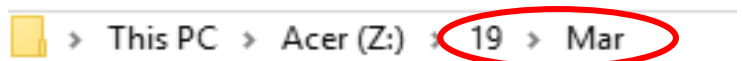
### Step 3:

Press USB Data Mode button to begin the connection between the Dip Go! and your PC



### Step 4:

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



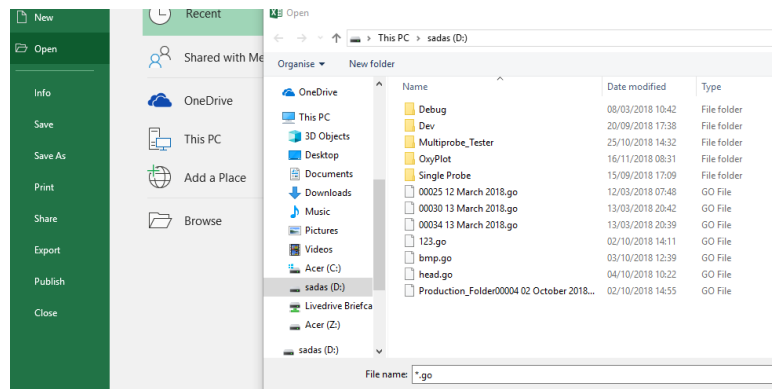
To access Data \*. GO in Excel

### Step 5:

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

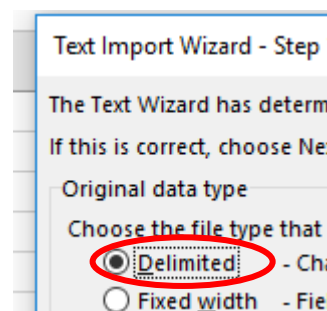
Type in \*. go as below and click on file.

File name: \*.go



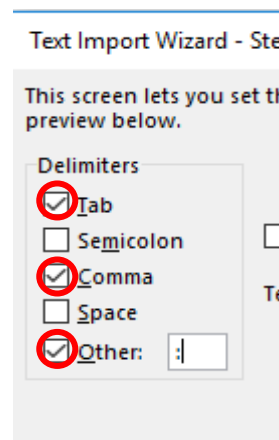
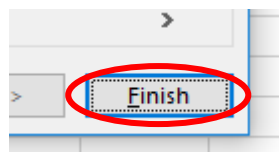
### Step 6:

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



### Step 7:

Then ensure tab, comma and other are ticked. Enter a colon and press Finish



## Contact Us

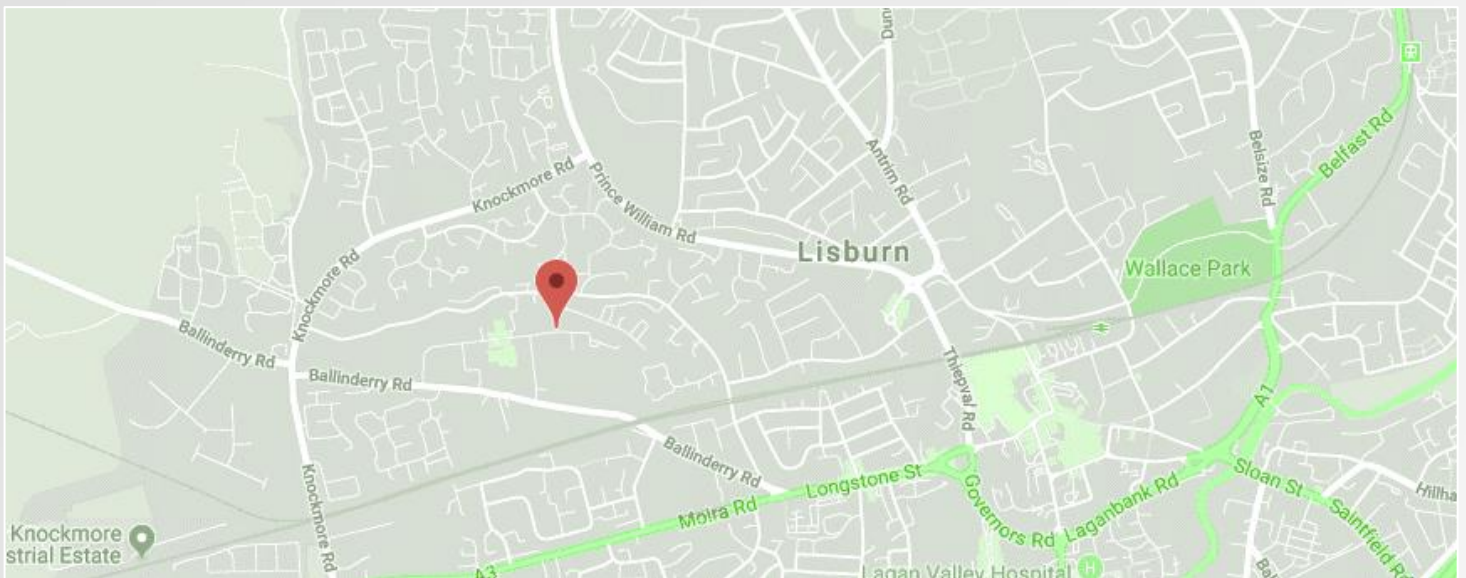
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