

## ECO Chlorophyll Fluorometer Characterization Sheet

Date: 2/15/2019

S/N: BBFL2WB-1437

Chlorophyll concentration expressed in  $\mu\text{g/l}$  can be derived using the equation:

$$\text{CHL } (\mu\text{g/l}) = \text{Scale Factor} * (\text{Output} - \text{Dark counts})$$

<b>Dark counts</b>	<b>Digital</b> 51 counts
<b>Scale Factor (SF)</b>	0.0122 $\mu\text{g/l/count}$
<b>Maximum Output</b>	4130 counts
<b>Resolution</b>	1.1 counts
Ambient temperature during characterization	22.3 °C

**Dark Counts:** Signal output of the meter in clean water with black tape over detector.

**SF:** Determined using the following equation:  $\text{SF} = x \div (\text{output} - \text{dark counts})$ , where x is the concentration of the solution used during instrument characterization. SF is used to derive instrument output concentration from the raw signal output of the fluorometer.

**Maximum Output:** Maximum signal output the fluorometer is capable of.

**Resolution:** Standard deviation of 1 minute of collected data.

The relationship between fluorescence and chlorophyll-a concentrations in-situ is highly variable. The scale factor listed on this document was determined using a mono-culture of phytoplankton (*Thalassiosira weissflogii*). The population was assumed to be reasonably healthy and the concentration was determined by using the absorption method. To accurately determine chlorophyll concentration using a fluorometer, you must perform secondary measurements on the populations of interest. This is typically done using extraction-based measurement techniques on discrete samples. For additional information on determining chlorophyll concentration see "Standard Methods for the Examination of Water and Wastewater" part 10200 H, published jointly by the American Public Health Association, American Water Works Association, and the Water Environment Federation.

## ECO Phycocyanin Fluorometer Characterization Sheet

Date: 2/15/2019

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Phycocyanin (Basic Blue 3 equivalent) concentration expressed in ppb can be derived using the equation:

$$\text{Phycocyanin (ppb)} = \text{Scale Factor} * (\text{Output} - \text{Dark Counts})$$

<b>Dark Counts</b>	<b>Digital</b> 43 counts
<b>Scale Factor (SF)</b>	0.0405 ppb/count
<b>Maximum Output</b>	4130 counts
<b>Resolution</b>	1.0 counts
Ambient temperature during characterization	22.3 °C

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**Dark Counts:** Signal output of the meter in clean water with black tape over detector.

**SF:** Determined using the following equation:  $SF = x \div (\text{output} - \text{dark counts})$ , where  $x$  is the concentration of the solution used during instrument characterization. SF is used to derive instrument output concentration from the raw signal output of the fluo

**Maximum Output:** Maximum signal output the fluorometer is capable of.

**Resolution:** Standard deviation of 1 minute of collected data.

## Scattering Meter Calibration Sheet

2/9/2019

Wavelength: 700

S/N BBFL2WB-1437

Use the following equation to obtain "scaled" output values:

$$\beta(\theta_c) \text{ m}^{-1} \text{ sr}^{-1} = \text{Scale Factor} \times (\text{Output} - \text{Dark Counts})$$

- **Scale Factor for 700 nm** = 3.322E-06 (m<sup>-1</sup>sr<sup>-1</sup>)/counts
- **Output** = meter reading counts
- **Dark Counts** = 57 counts

Instrument Resolution = 1.1 counts 3.65E-06 (m<sup>-1</sup>sr<sup>-1</sup>)

### Definitions:

- **Scale Factor:** Calibration scale factor,  $\beta(\theta_c)$ /counts. Refer to User's Guide for derivation.
- **Output:** Measured signal output of the scattering meter.
- **Dark Counts:** Signal obtained by covering detector with black tape and submersing sensor in water.

Instrument Resolution: Standard deviation of 1 minute of collected data.



## ECO Calibration and Repairs

**Diagnosis:** Evaluated instrument (BBFL2WB-1437) and found no problems.

**Repairs and Modifications:** Standard service performed. Verified tuning, tested, and characterized instrument. Replaced battery pack, batteries, wiper, faceplate, and all case seals.

**Comments:** New Device file and characterization sheets included.

### **ECO Standard Service:**

The instrument bulkhead connector, pressure housing and window\optics are inspected for damage. Instrument is checked to determine proper functionality. Incoming settings and memory are collected if incoming condition allows.

A pre-service characterization is performed. Data is analyzed and Instrument is rescaled, if applicable.

The head is inspected for cracks in detector and motor bores. Case seals, shaft, shaft seal, faceplate, wiper, desiccant pack and batteries (if equipped) are replaced. Noise, stability, and live pressure test is performed.

Final calibration and characterization is completed. Including calibration of thermistor and pressure sensor, if equipped. A device file, repair sheet, and new characterization sheets are provided to customer via hard copy and CD.