

Chlorophyll Fluorometer Characterization Sheet

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S/N: SEAOWLA2K-0144

Chlorophyll concentration expressed in $\mu\text{g l}^{-1}$ can be derived using the equation:

$$\text{CHL } (\mu\text{g chlorophyll l}^{-1}) = \text{Scale Factor} * (\text{Output} - \text{Dark counts})$$

Dark counts, this characterization

Dark counts Range

Scale Factor (SF)

Resolution

Standard Error as % of Scale Factor

Specified Range:

Maximum Output (see note below)

min: 47 max:

1.5 counts

50 counts

53 counts

1.949E-03 $\mu\text{g CHL l}^{-1} \text{ count}^{-1}$

2.83E-03 $\mu\text{g CHL l}^{-1}$

0.87 %

min: 250 $\mu\text{g CHL l}^{-1}$

312 $\mu\text{g chlorophyll l}^{-1}$

- **Output:** Signal output of the instrument.
- **Dark Counts:** The average in counts of 1 minute of collected data after 15 minutes of warm-up obtained by covering the detector with the black tape and submersing the sensor in a grounded water bath. The characterization dark counts value is not expected to be the same as the dark counts after integration. Use the dark counts measured after integration for data processing.
- **Dark Counts Range:** Minimum and maximum values recorded in the data collected to determine the dark count value.
- **Scale Factor:** The slope of the linear regression of the target addition series comparing this instrument to a reference instrument.
- **Resolution:** Standard deviation in counts of the data collected to determine the dark counts presented as counts and engineering units by multiplying by the scale factor. For standard deviations of less than one count, resolution is the same as the scale factor.
- **Maximum Output:** Maximum potential scaled output of the instrument. This value is generally greater than the specified range.

Characterization Methodology:

We perform a multipoint linear regression analysis of the output of this instrument to the output of a calibrated reference instrument using an additive sequence of increasing loadings of uranine dye. The goodness of fit is determined by the standard error which must be less than 1% of the scale factor. The reference units were calibrated to extracted chlorophyll by measuring the fluorescence response in a monoculture of *Thalassiosira weissflogii* in controlled light conditions and in exponential phase growth. The chlorophyll concentration from the cultures was determined by the extraction and fluorescence method. This establishes an instrument response to chlorophyll concentration scale factor for the reference unit, with respect to the particular culture used. Caution should be observed in using the calibrated value without reference to grab samples.

Note on Maximum Output:

The maximum number of counts that the instrument can output is approximately 160,000. In most natural waters the potential range of the instrument is greater than the measurable range due to interference factors, e.g. the absorbance length scale. Caution should be used for data sets in which the reported values exceed the specified range. Grab samples should be used to confirm values above the specified range.