Odyssey Photosynthetic Irradiance Logger.

Contents.

Photosynthetic Active Radiation PAR 400 to 700 nm for use either in air or under water in photosynthesis studies.

The response of these sensors to irradiance at varying angles corresponds very closely to that required by the cosine law. They have been designed to provide an economical alternative solution in applications where relative measurements are more important than absolute accuracy.

These sensors are manufactured with an internal integrator and Odyssey data recorder. The integrator produces a pulse output that is directly proportional to the light intensity entering the photo sensor. The combined recorder and sensor can be submerged to 20 metres.

The Odyssey internal counter accumulates data over a user-defined period. The nominal recording period under normal light intensities is 5 minutes. The data recorder accumulates the pulse data from the sensor and records the accumulated value at the end of each scan time. The scan time can be varied depending on resolution required and light intensity. The maximum value that can be recorded over the set scan time is 65535 counts. If you are unsure of the resultant output from the logger in a particular environment, then it should be set up on a 5 minute scan time to see what the magnitude of the integrated measurement is. The scan time can then be adjusted to suit the application.

The integrator output, because it is proportional to the incoming light intensity, cannot be averaged, as this would mask the variations in the incoming light.

The sensor features a cosine response and is based on a design evaluated by the University of Western Australia. The design was published by the Freshwater Biological Association in the UK as a simple and inexpensive equal energy response photosynthetic irradiance sensor (for use where several cells are required in comparative ecological studies either above or below water).

Sensor Operation.

The light head has two parts integrated into the light sensor head - the sensor head and an electronic integrator amplifier. The current from the light head sensor is coupled to the electronic integrating amplifier. This amplifier gives a pulse output, the repetition rate being proportional to the intensity of the light energy reaching the sensor. The Odyssey data recorder that is an integral part of the sensor counts these pulses.

At the end of each scan interval, the total accumulated counts from the integrator are recorded in the log.

Operating Procedure.

The logger scan time can be set to any time that will not cause an overflow in the counter. The maximum value that can be stored between sensor scans is 65535. In order to obtain good resolution in the variation of the light intensity, the scan rate should be set within the range of 5-15 minutes. The count rate per minute should be checked by doing a test recording to ensure that the maximum value of 65535 is not exceeded.

The sensor should be mounted so that the light head is vertical. The mounting position should be chosen so that it is clear of any shadow, which may be cast from surrounding objects.

Calibration.

Note: *The recorders are not calibrated prior to despatch.*

The loggers are software calibrated making it easy for the end user to check the logger calibration at any time. The values derived from a new calibration are simply entered into the calibration file using the Odyssey software.

Because the recorder is software calibrated, the units of measurement may be chosen by the user. Odyssey PAR sensors can be calibrated under solar radiation beside a calibration standard such as the Licor (Li-190).

The recorder should always be kept clean and treated as a scientific instrument in order to maintain its calibration. The vertical edge of the diffuser must be kept clean in order to maintain appropriate cosine correction.

An approximate calibration can be obtained if it is assumed that daylight quantum flux measurements at solar noon are typically about 2000 micro Einstein per second per meter square.

Approximate conversion factors for daylight are (waveband 400 to700nm): -
watts per metre^2 to micro Einstein per second per metre^2 multiply by 4.6
lux to micro Einstein per second per metre^2 multiply by 18
lux to watts per metre^2 multiply by 4

Because the output from the sensor in darkness is zero then the first calibration point is zero for the uncalibrated value and also zero for the measured value.

Memory Storage Capacity.

These loggers store 2 bytes per reading.

The amount of memory is capable of recording 32764 records. The time span in days can be calculated by dividing 32764 by the number of logs per day.

Example:
A scan time of 30 minutes has 48 recordings each day. The total number of days is *682 days. A scan of 10 minutes has 144 recordings each day. The total number of days is 227 days.

When the memory is full the recorder shuts down.

***Note:** When using a long scan time it is possible for the battery to expire before the memory becomes full.*