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Model No. EMS 7 - Plant Canopy Analyzer



EMS 7- PAR, Plant Canopy analyser Kit

Specification

Response : PAR in the 0.4 - 0.7 micron range.
Range with a small overlap in UV and infra red ranges.

Output sensors : 200mV per 2000 μ mols $m^{-2}s^{-1}$
Output for 2 channel logger: 6 pin DIN connector.
(0 - 20 mA output for reference and sample sensors, optional).

Power : 9v PP3, 150 uA, 1 year approx.

Accessories

Line Sensor, Reference Sensor, 50 meter Ext. Cable, and Carrying case, Tripod

The **EMS 7** is a portable photo system for the determination of the PAR (photosynthetically active radiation) above and within plant canopies. It is very useful in plant physiological and ecological studies.

The system consists of two PAR sensors, a reference sensor and a sample sensor.

The reference sensor is 40mm diameter with a Scipps head to give true cosine response and a bulls eye level for levelling. The base of the sensor is threaded with a standard 1/4" tripod socket. The reference sensor is normally mounted on a rigid support outside the canopy to be studied.

The sample sensor is a line sensor 750 mm in length made up of 30 cells mounted in an aluminium trough and covered by a diffuser. The sensor has a uniform response over the 750mm length, integrating the values of PAR radiation passing through a canopy. A level is attached to the sensor to ensure the sensor is held horizontally when measurements are made.

The reference sensor is connected to the sample sensor either by cable or radio link.

Attached to the sample sensor is an indicator box which enables the absolute and ratio values of the sensors to be seen.



SW-11L PAR Line Sensor

Specification

Materials: Anodised Aluminum, Acrylic. IP65 sealed.

Cable: 5m Enhanced polyethylene screened twin
18 x 0.1mm.

Sensor: 33, GaAsP Photodiodes. 350 - 680nm. peak
at 640nm.

Sensitivity: 1 mV/10 mmol / m²/s.

Temperature sensitivity: $\pm 0.15\%$ /°C at peak response,
from 0 - 50°C.

Linearity: 1% over 0 - 2000 μ mol/m²/s.

Uniformity of sensing surface: Better than 2% over
0.85 sensing length.

Response time: 2 μ s. 10 - 90%

Output: 200mV / 2,000 μ mol / m² / s.

Operating temperature range: -20°C - + 50°C.

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EMS 6/2 Datalogger 2 channel

The EMS 6 series of data loggers is based on the 2 channel Lascar EasyLog modules. These are very flexible units that are programmed with a standard PC using the EL-WIN software.

Input ranges: -200 to +200mV dc to 0 - 20v dc. 4 - 20mA and Pt100.

Memory: 8000 samples per channel, 1 - 10 channels.

Sample rate: 1 per second to 1 per 12 hours and single shot.

Power: 3.5v 1/2 lithium (logger) and 12v, 0.8Ah lead acid (sensor Supply, can be linked to sampling to limit power use).

Operating time: Logger up to 3 years, sensor output dependant upon sensors and frequency of sampling.

The EMS 6 series of data loggers is based on the 2 single channel Lascar EasyLog modules. These are very flexible units that are programmed with a standard "pc" using the EL-WIN software. EL-WIN software provided (on disc) is Windows 78 and XP compatible. The loggers can be programmed to record at intervals of 1s - 24h. with up to 8000 readings per channel in a normal or rolling mode .. Logging can be started immediately or at a delayed start time. It can also be initiated by pressing the start button on the front panel. Timing is independent in the 2 channels of each module and can be varied between modules. The start button can also be used to operate a one shot logging operation, A variety of scaling factors and ranges are available allowing the use of engineering units if required. Individual channels can be individually calibrated.

There are several ways of storing the data, normal, rolling, histogram and one shot.

The software permits the graphing of data and transfer to other computer spread sheets.

The logger uses a single 1/2 AA lithium battery giving up to 3 years operation in the field.

Field Measurements

The reference sensor should be mounted horizontally outside the canopy on a firm support such as a tripod. A 360° spirit level is provided for this purpose ensure the sensor is not likely to be shaded during measurements. The reference sensor is attached to the indicator box via the 3 pin DIN connector at the base. Insert the sample sensor horizontally into the canopy at the level the % transmission measurement is required. Push the ON/OFF switch to turn the meter "ON" and rotate the rotary switch fully to the left to %. The reading on the meter will now be the % transmission of PAR at that level in the canopy relative to that being received external to the canopy. The rotary switch can be used to view absolute measurement from the reference (ref.) and sample (smp.) sensors.

The individual readings of the sample and reference sensors are displayed in $\mu\text{.mols. m}^{-2}\text{s}^{-1}$ and the ratio of the sample to reference reading as a % and 1/10ths.

To determine the amount of energy absorbed by the canopy the PAR albedo of the canopy has to be considered. By inverting the sample sensor above the canopy (0.5m) the albedo can be measured. To simplify the reading of the meter in this position the reading can be held by pressing the hold button in the upper end of the indicator box while inverting the box to read the meter.

Energy absorbed by the canopy = (ref. reading - albedo reading)(1 - %reading/100).

The validity of this may vary with canopy structure.

On the right hand side of the indicator box is a 6 way DIN connector that provides direct access to the output signals from the sensors for linkage to loggers or a radio link.