SUN SYSTEM®

PAR METER

INSTRUCTION MANUAL

Product #748200

Product #748205

1 YEAR WARRANTY

Measuring PPF with Quantum Meter

Photosynthesis is driven by the number of photons between 400 and 700 nanometers (nm). This is called the Photosynthetic Photon Flux (PPF) and is measured in micromoles (μmol) per meters squared per second. PPF meters are commonly called quantum meters because a quantum refers to the amount of energy carried by a photon.

Quantum Meter Models

Quantum meter models available:

#748200
Meter with integrated sensor

#748205
Meter with remote sensor

Cleaning

Debris on the meter is a common cause of low readings. Salt deposits can accumulate on a sensor from evaporation of sprinkler irrigation water and dust, which can accumulate during periods of low rainfall. Salt deposits should be dissolved and removed with vinegar and a soft cloth or cotton swab. Dust and other organic deposits are best removed with water, rubbing alcohol, or window cleaner. *Never use an abrasive cleaner on the lens.*

Application

Line quantum sensors are often used to quantify the variable light in greenhouses and below plant canopies, because they provide a spatial average.

Using the Meter

1) Press the power button to start. The meter will turn itself off 2 minutes after the button is pressed to conserve battery.

2) Choose Calibration: To select between sun and electric calibration, push mode once, and use up/down to select. Once desired mode is blinking, press mode three more times to begin.

3) Choose Mode: To choose between SMPL and LOG modes push mode, twice, and use up/down to select. Once desired mode is blinking, press mode two more times to begin.

   For Automatic Measurements: Use LOG mode. Meter will power on/off to record a measurement every thirty seconds.

   For Manual Measurements: Use SMPL mode. Press sample when you want to take a measurement. Store up to 99 manual measurements.

4) Reset Meter: From LOG or SMPL mode, press mode twice (RUN should be blinking), then while pressing down, press mode once.

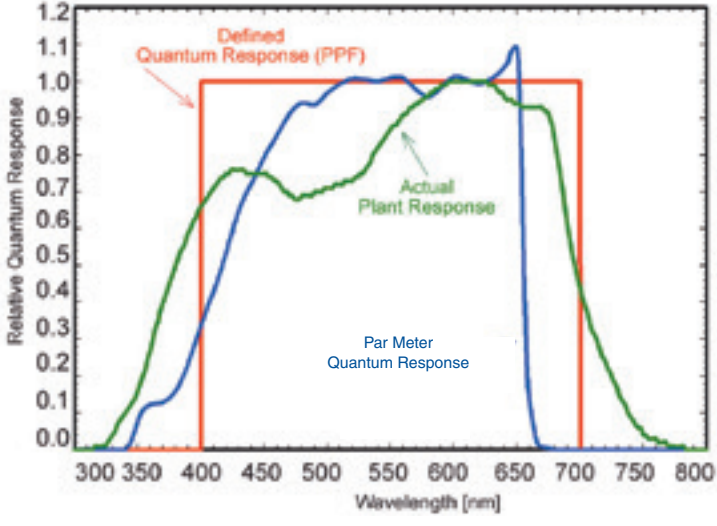
Caution: Resetting will erase ALL measurements.

5) Review Data: Press up/down. To exit and return to present conditions and the capability to take measurements, press sample.

6) In LOG mode, every 30 minutes the meter will average the 60, 30-second measurements taken and store the average. 99, 30-minute averaged measurements can be stored. Every 48 measurements (making a 24-hour period), the meter will also store a daily total. In addition, 99 daily averages can be stored and are available for download only. These measurements are not viewable on the meter LCD. All measurements taken in LOG mode will continue to be stored eliminating the oldest measurement.

Spectral Response

As shown in the graph below, quantum response by definition is from 400 to 700 nm and gives equal emphasis to all photons in that range. The spectral response of the par meter sensor, as well as a typical plant response, are also shown.



Spectral Differences

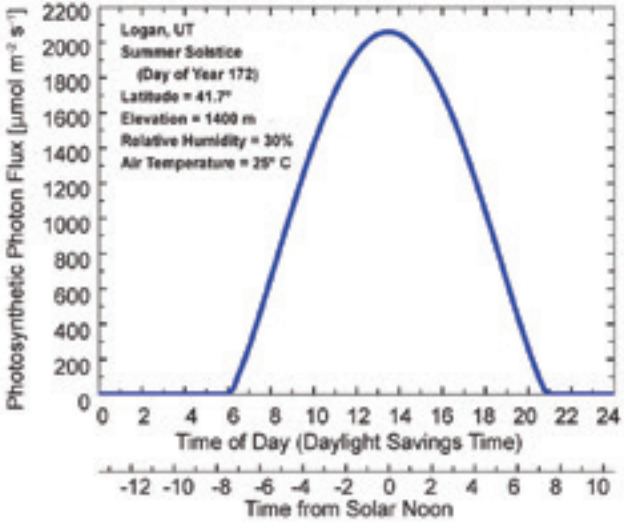
Sun System par meters are calibrated for both electric light and sunlight. The difference in calibration is close to 10%. A sensor calibrated for fluorescent lamps will read about 10% low in sunlight. A sensor calibrated for sunlight will read about 10% high under fluorescent lamps. The spectral errors are less than 2% for other common electric light sources.

	Electric Calibration	Sunlight Calibration
 Cool White Fluorescent	Calibration Reference	10% high
 Metal Halide	< 2% low	8% high
 High Pressure Sodium	< 2% low	8% high
 Sunlight	10% low	↑ Calibration Reference

The Clear Sky Calculator is designed to determine the need for radiation sensor recalibration. It determines the intensity of radiation falling on a horizontal surface at any time of the day in any location in the world. It is most accurate when used near solar noon in the summer months.

The calculator is found at www.clearskycalculator.com and is used by typing conditions into the Clear Sky model and comparing measured values with the calculated value for a clear sky. If the output of the sensor over multiple days at solar noon is consistently less than the model value (by more than 8%), the sensor should be cleaned and re-leveled. When used near solar noon over multiple clear, unpolluted days during the spring and summer months, it is estimated that the accuracy of the model can be ± 4% in all climates and locations around the world.

Example of Model Output



Characteristics

Cosine Response

Some of the radiation coming into a sensor at low angles is reflected, causing low readings. The convex optical disc found on meters, sensors, and line quantum sensors is designed to capture radiation at low angles and minimize cosine response errors. The cosine error for typical applications is less than 2%.

Temperature Response

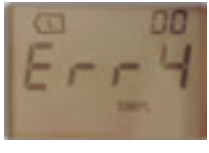
The temperature response is less than 0.1% per degree celsius. This temperature error is not significant in most applications.

Long-Term Stability

Our research indicates that the average output increases approximately 1% per year, because of changes in the optical transparency of the diffusion disk. We recommend returning the sensor for recalibration every 2 years.

Error Codes

The most common error code is Error 4. The meter will display this error code on the screen if the battery voltage is too low.
To replace the battery, unscrew the back area on the meter. Then use a pair of tweezers to gently remove the battery and replace it with a new one. Screw the back cover back on the meter, but be careful not to over-tighten as it can affect the LCD screen.



Specifications

Application
Measuring Photosynthetic Photon Flux (PPF)

Measurement Range
0 to 2999 μmol m

Input Power
CR2320 3 V coin cell battery

Operating Environment
0 to 50° C
Less than 90% non-condensing relative humidity up to 30° C
Less than 70% relative humidity from 30° to 50° C

Display
4.5 cm width by 2.8 cm height

Cable (#748205 only)
2 meters of twisted-pair wire
Foil shield
Santoprene jacket
Longer cable lengths are available in multiples of 5 meters

Dimensions
12.6 by 7 by 2.4 cm

Mass
#748200: 150 g
#748205: 180 g

Warranty
1 year against defects in materials and workmanship

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CO

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