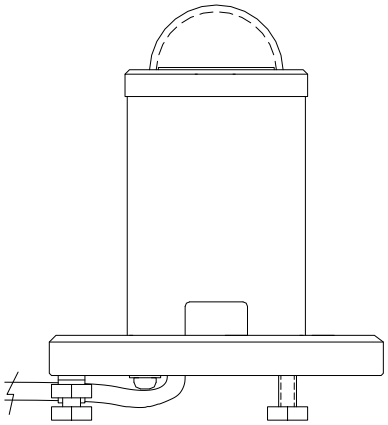
MIDDLETON SOLAR
SK01-DP2 PAR SENSOR
USER'S INSTRUCTIONS

CE 2005



The SK01-DP2 **P**hotosynthetically **A**ctive **R**adiation Sensor (or Quantum sensor) is for monitoring the electromagnetic radiation regulating photosynthesis in plants. It uses a silicon photodiode detector, shielded by a cosine-corrected diffuser and an interference reflector, to measure PAR on a horizontal surface. It has a glass dome to keep debris off the diffuser. The detector signal is boosted by a low noise amplifier that is drift stabilised.

PAR is reported as the total photon exposure in the 400-700nm waveband, and *micro-moles per second per square meter* is the unit of measurement for the Photosynthetic Photon Flux Density (PPFD)[1]. Typical maximum solar PPFD is 2000μmol.s^{-1}.m^{-2} . PAR is approximately 47% of terrestrial total solar irradiance.

Mounting. Place the instrument on a flat horizontal platform and adjust the three feet with a 7mm A.F. spanner until the circular level is centered. Secure the instrument to the platform with a 5mm holding screw in the centre of the base; the screw should be brass or stainless steel.

Power up the instrument by connecting the lead to the terminals of a 4.5-14.5VDC supply (a fresh 9V PP3 alkaline battery will power the instrument for up to 200 hours).

red to +ve blue to -ve.

Measure the output signal by connecting the lead to a voltmeter, data-logger, chart recorder, or similar instrument.

Yellow to +ve green to -ve.

Note: the instrument has a low current drain and a 50ms settling time; it is suitable for unattended installation with a battery operated datalogger periodically powering it up.

Calibration. The SK01-DP2 is calibrated in sunlight by comparison to a reference PAR Sensor. It is recommended that the calibration be checked annually.

The output signal is factory set to 0.5mV/μmol.s^{-1}.m^{-2} (so 1 volt = 2000μmol.s^{-1}.m^{-2})

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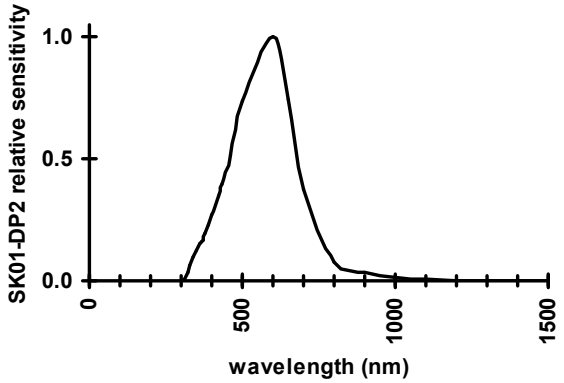
[1] PPFD Conversion Factors: 1μmol.s^{-1}.m^{-2} = 1μEinstein.s^{-1}.m^{-2} = 6.02 x 10^{17} photons

Photodiode detectors do not have a flat spectral response and their output is dependent on the spectral weighting of the light source. The SK01-DP2 relative error, for common artificial PAR light sources vs sunlight, is less than ±5%.

Maintenance. Keep the dome of the SK01-DP2 clean and free from debris otherwise the directional response will be compromised. Damaged or faulty units should be returned to the manufacturer for repair.

Technical Specification



parameter	specification
viewing angle	2π steradians
spectral range	400-700nm (see chart above)
irradiance	0-3000 μmol.s^{-1}.m^{-2}
sensitivity	0.5mV/μmol.s^{-1}.m^{-2}
response time (to 95%)	30ms
operating temperature	-35°C to +60°C
temperature response	< ± 0.15% per °C
non-stability (per year)	-0.5% (typical)
non-linearity	< 1%
directional response	< ± 1% for 0-75° zenith angle < -10% to 80° zenith angle
spectral response	± 5%
tilt response	no tilt error
operating temperature	-35°C to +60°C
calibration accuracy	± 3%
sensor type	silicon photodiode
PAR filter	CWL: 470nm. FWHM: 271nm
lead	3m
mounting	central M5 hole; two adjustable feet
construction	aluminium, hard anodized for corrosion resistance. Stainless steel fasteners
IP rating	sealed to IP66

Signal Amplifier	
type	chopper stabilised (for zero amplifier drift)
voltage & current	5.5V to 14.5V, 3mA
dark offset	< +0.5mV
output characteristic	external load > 3KΩ; max. output current: +2mA source, -5mA sink
overvoltage & polarity reversal protection	> 15V; > 0.2A
settling time after power on	50ms