



# LIGHT

**Agriculture/Horticulture**  
**Meteorology**  
**Plant Growth Studies**  
**Animal/Human/Building Studies**  
**Ultraviolet Studies**

## INTRODUCTION TO SKYE SENSORS

Skye have been designing and manufacturing light sensors since 1983. We have a worldwide reputation for producing sensors to a high specification which are robust, durable and reliable. Much development time has been invested in producing sensors which meet expected and published spectral responses. Every sensor is individually calibrated against, and is traceable to National Standards. For most sensors this means the UK National Physical Laboratory. Each sensor is issued with a calibration certificate showing traceability.

All are fully waterproof and can be submerged to a depth of 4m with the exception of the Fibre Optic Probe and the Sensors for Controlled Environments.

Most sensors are "cosine corrected" meaning they measure light from a hemisphere according to Lamberts Cosine Law. There are also narrow angle acceptance versions and a fibre optic probe for small, inaccessible areas.

All sensors have many applications and uses, the most common are shown in the key on the right. Please note that any sensor type may have a customised response to suit various research needs. Those most commonly supplied with filtering chosen by the customer are shown as 'custom'.

Sensors have been designed with versatile outputs to suit almost all logging and readout equipment and can be supplied on their own for use with the customers equipment or with a Skye logger or meter as shown in this leaflet.

All items described below have an individual datasheet detailing in depth their technical parameters. Please request a copy.

## SINGLE CHANNEL SENSORS



### PAR Quantum (SKP 215) PAR 'Special' (SKP 210)

These sensors, traditionally used in plant growth studies, count the number of quanta falling between 400 and 700nm. The number of quanta is related to plant sugar production and photosynthesis and is measured in  $\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$

The PAR Quantum is the sensor with the ideal 100% quantum efficiency curve and is traditionally used in plant growth studies. The spectral response has been well researched and documented and is widely accepted as 'the standard'.

The PAR 'Special' is produced exclusively by Skye. It was developed at the request of researchers wanting a sensor which simulates the photosynthetic response of plants. It is often used in conjunction with the PAR Quantum.

Output: mV or  $\mu\text{A}$



### PAR Energy Sensor (SKE 510)

This sensor measures energy (rather than quanta) in  $\text{watts}\cdot\text{m}^{-2}$  within the 400-700nm waveband. This sensor is useful if studies involve the use of other instruments, such as pyranometers, which also measure in  $\text{watts}\cdot\text{m}^{-2}$

Output: mV or  $\mu\text{A}$



## USES AND USERS

Light sensors have a wide range of applications in both research and commercial areas. The major use of Skye's light sensors are in plant growth and crop research, where the intensity, distribution and quality of light is essential to improving plant quality and yield.

An increasingly popular application is the measurement of reflected light. The SpectroSense2 meter has been specifically designed for this purpose, enabling plant health and quality monitoring, NDVI ratios, and satellite ground truthing in hydrology and geography applications.

Other applications requiring light measurements include museums for the protection of exhibits, water pollution monitoring, weathering and UV damage studies.

### KEY



Plant Growth Studies



Agriculture/Horticulture



Meteorology



Ultraviolet Studies



Human/Animal/Building Studies



Custom Built Sensors



### Pyranometer (SKS 1110)



For measurement of total solar radiation in outdoor locations we offer the silicon cell Pyranometer. A very popular and cost effective sensor, which is calibrated against a WMO Secondary Standard Thermopile Pyranometer, traceable to the UK Meteorological Office. Output is proportional to total solar energy in  $\text{watts.m}^2$

Output:  $\text{mV}$  or  $\mu\text{A}$



### UVA Sensor (SKU 420) UVB Sensor (SKU 430)



Two sensors designed to measure the UVA (315-380nm) and UVB (280-315nm) in natural solar radiation. Components used have been selected for their stability in a UV environment. The bandwidth characteristics are tailored to DIN standards. Calibrated in  $\text{watts.m}^2$

Output:  $\text{mV}$



### Lux or Photometric Sensor (SKL 310)



The response curve of this sensor matches the CIE Photopic curve (a standard for the human eye response to light) and measures in lux units. This is the preferred sensor for human and animal studies.

Output:  $\text{mV}$  or  $\mu\text{A}$



### Sensors for the Hansatech Leaf Chamber (SKP 216)



A sensor designed especially for use with the leaf chamber produced by Hansatech Ltd. There is a choice of two spectral responses - the standard PAR Quantum response (SKP 216Q) and a 550-750nm response (SKP 216ER) to match the LED's used for leaf illumination.

Output:  $\text{mV}$  or  $\mu\text{A}$

*(Please note these sensors are only intended to be used in conjunction with the Hansatech Chamber)*



## 2 & 4 CHANNEL SENSORS



### Red/Far-Red Sensor (SKR 110)



A two channel sensor with narrow band filters centered at 660 (red) and 730nm (far-red). A very popular filter combination important for plant phytochrome studies, and controlling plant responses in mixed lighting conditions.

Often used with the Display Meter or SpectroSense2 Meter for direct readout of Red/Far-red ratios. Calibrated in  $\mu\text{mol.m}^{-2}.\text{s}^{-1}$

Output:  $\mu\text{A}$



### Incident and/or Reflected Light (SKR 1800 series)



Specialised sensors for those who need to measure reflected as well as incident light at two or four different wavelengths, ideal for NDVI and ground truth measurements. These units can be used either with or without the cosine collecting adapter in place on top of the sensor. With the adapter in place the light measured is from a cosine (hemispherical) distribution. If the adapter is removed, then the two or four channel narrow acceptance angle channels are exposed for use with light reflected from the surface to be studied. Wavelengths and bandwidths can be ordered between 400 and 1050nm. Can be calibrated in  $\mu\text{mols.m}^{-2}.\text{s}^{-1}$  or  $\text{watts.m}^2$  as required.

SKR 1800 2-channel sensor  
SKR 1850 / SKR 1850A 4-channel sensor

Output:  $\mu\text{A}$   
Output:  $\text{mV}$  or  $\mu\text{A}$



### Fibre Optic Probe (SKR 116)



A one or two channel meter with a 1m long fibre optic probe extension. The light is collected from the tip of the probe at right angles to its long axis. Thus the probe can be inserted in short grass sward and collect down-welling light. The filters and diodes are housed in a small polycarbonate box, which is neatly mounted with the display meter to make a compact hand-held system. The response of this probe can be chosen from the standard range of sensors, e.g. a PAR Quantum response (single channel) or Red/Far red (two channel).



Output:  $\mu\text{A}$



## AMPLIFIED SENSORS



### High Output Light Sensors (HOPL)



Our standard light sensors - PAR Quantum, PAR 'Special', PAR Energy, Lux, Pyranometer and UVA sensors are also available with an amplified output to suit a wide range of recording equipment. Choose from 0-1 volt, 0-5 volts, 0-10 volts or 4-20mA with full-scale values to suit your application.

Output: voltage or current



## SENSORS FOR CONTROLLED ENVIRONMENTS



### Non-Waterproof Sensors



A range of splashproof sensors specially designed for controlled environments, such as plant growth chambers and photo-stability cabinets. Choose from PAR Quantum, PAR Energy, Lux or UV outputs. Outputs and scaling to suit the controllers and cabinets.

Output:  $\text{mV}$  or  $\mu\text{A}$



DataHog



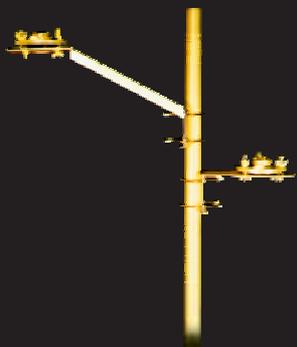
SpectroSense2



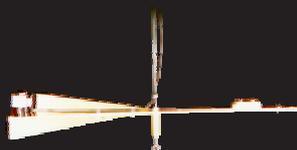
Display meter



Levelling unit



Pole mounts



Lowering frame



## METERS AND DATALOGGERS

### DataHog2 - The Skye datalogger

A small, versatile datalogger from one channel up to sixteen channels. The inputs can be combined with other types of sensors. Supplied in a waterproof enclosure. Versions available with an integral light sensor, giving a 'cable-free' automatic light measuring system. Battery operated with a lifetime of up to six months (depending on the set up of the logger). An easy to use logger configured "ready to go" when purchased with sensors as a system.

### SpectroSense2 & SpectroSense2+

A 4 channel display meter or 8 channel logging display meter for light sensors from Skye or other manufacturers. The 4 line LCD displays readings from 4 or 8 sensors / channels simultaneously, with Hold button for easy use. Ratios between sensor / channel pairs and NDVI calculations are also displayed or logged as required.

Ideal as a versatile meter with interchangeable sensors, a quality control tool or a dedicated system for incident / reflected light and NDVI studies. The meter is supplied with batteries, PC cable and software (logging version only). It is set up ready for use when supplied with sensors.

### Display meter

These are available for 1 and 2 channel sensors and are individually calibrated with its matching sensor. These low cost measuring units have an LCD display and give instantaneous readings of the light levels the sensors are currently exposed to. There is a 3-way range switch to cover low, medium and high levels of light. Two channel meters also have a ratio feature for direct readout of 2 sensors or channels e.g. Red / Far-red ratio. They are battery operated and are supplied with a carrying case which also houses the sensor.



## ACCESSORIES

### Levelling unit

An aluminium plate with level bubble and levelling screws for the light sensors. For accurate measurement of incident light, sensors should be mounted horizontally. Versions available to match different sensor types.

### Pole/wall mount for levelling units and DataHogs

Mounts with long or short arm brackets are available and are supplied with 'V' bolts suitable for poles (vertical or horizontal) up to 50mm diameter. Alternatively the bolt holes may be used to fasten the bracket to a wall etc. Both long and short brackets are shown here with levelling units on the same pole.

### Underwater Lowering frame

To be used as a levelling and stabilizing platform for light sensors under water. Suitable for one or two sensors, facing up and/or down. Designed to hold sensors vertical and steady in still or flowing waters.



## Skype customers include:-

- British Aerospace
- Royal Air Force
- British Antarctic Survey
- British Steel
- Syngenta Limited
- Scottish Crop Research Institute
- Crown Agents
- Swiss Federal Institute for Forest, Snow and Landscape Research
- Danish Institute of Agricultural Sciences
- British Gas
- Royal Mint
- University of London
- University of Glasgow
- Horticultural Research Institute
- Institute of Grassland and Environmental Research
- Centre of Ecology & Hydrology



## THOUSANDS OF CUSTOMERS IN OVER ONE HUNDRED COUNTRIES

Skype is a family run company, and since 1983 has exported instruments to nearly every country in the world. We pride ourselves on customer care and our flexibility when it comes to providing the customer with what they need.



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environmental and botanical  
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