

## Why Choose Skye Sensors?

When considering any purchase, it is good practice to check the specification and reputation of comparable models from different manufacturers, to ensure the purchase will meet the user's application and budget. For scientific instrumentation that will be used long term in all field conditions, this is especially important for data integrity and project recognition.

Skye Instruments Multichannel Radiometers and Spectral Albedometers, which include sensors configured for NDVI and PRI measurements amongst many other Indices, boast the following features:

- Skye Instruments have been designing, manufacturing and calibrating Light and Radiation sensors since 1983.
- These sensors have been quoted in published scientific literature since 1985, please request a list.
- Skye have an excellent reputation for high quality, robust and accurate instrumentation, plus a reliable, helpful and prompt technical back up service.
- Skye NDVI and PRI sensors are well known and widely used in Precision Agriculture, Remote Sensing, Climate Change, Carbon Balance and Satellite Ground Truthing applications.
- They have been used by Fluxnet, Specnet and Carbo Europe communities, since at least 2004.
- Calibration is, and has always been, fully traceable to National Standards via the National Physical Laboratory, the UK's National Measurement Institute.
- Sensors can be calibrated with up to 4 wavebands per sensor, choosing wavelengths between 280nm and 2400 nm. Calibration can be in Irradiance or Radiance units.
- Wavebands can be chosen from 10nm to several 100 nm wide. Sensors can be matched to most Earth Observational Satellite bands e.g. MODIS, LANDSAT etc.
- Each waveband channel in every sensor is individually calibrated using its exact spectral response and output, and is supplied with a Calibration Certificate and response curve.
- The user can choose the units of calibration, e.g. for irradiance either  $W.m^{-2}$  or  $\mu mol.m^{-2}.s^{-1}$ . A conversion factor between units can also be supplied at a later date if needed.
- Sensor pairs which make up a Spectral Albedometer are manufactured using carefully selected sets of waveband filters to ensure the closest spectral match between sensors. The matched spectral responses are provided with each Calibration Certificate.
- Complete systems can be supplied with Skye meters and dataloggers which have been designed specifically to measure the primary photodiode current outputs from the NDVI and PRI sensors. Amplified or mV outputs are also available to suit most dataloggers.
- The Skye DataHog2 logger will record from up to 16 wavebands and can auto upload data to a website.
- The Skye SpectroSense2+.GPS autoranging, logging meter is ideal for field mapping of NDVI, PRI, EVI etc.
- The sensors underwent a design change in 2013 following a survey and feedback from users. Skye are constantly looking to improve and develop their designs and welcome all feedback, positive and negative.



# SKR 1840 2 Channel Sensor

Skye Instruments have been specialising in light and radiation sensors since 1983. All are designed, manufactured and calibrated to the highest standards. Each is supplied with a Calibration Certificate traceable to the UK's National Physical Laboratory (NPL).

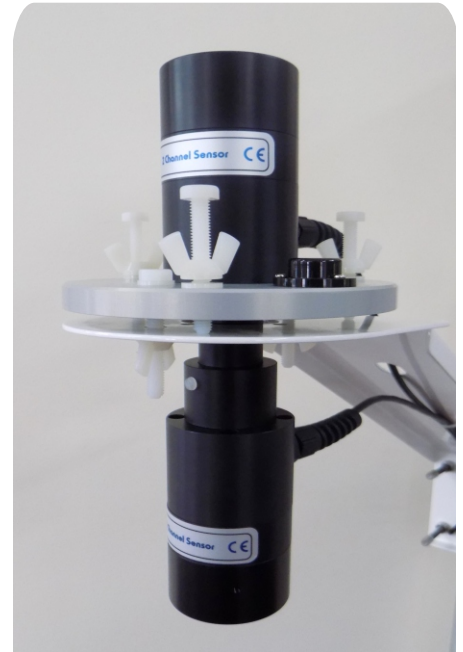
This sensor is a NEW 2 channel radiometer, specially designed for permanent installation on Flux Towers, masts, etc. The upward looking sensor which measures radiant light is cosine-corrected, and the downward looking sensor has a narrow 25° cone, suitable for measuring radiance from a defined area.

Usually a pair of sensors are used to measure incident and reflected light simultaneously, to eliminate variations in natural solar radiation during measurement.

Skye have a choice of wavelengths between 400 and 1050 nm, with bandwidths from 10 nm to several hundred nm (broadband). Popular choices include Red & Far-Red, NDVI & PRI for ground truthing, or channels matching satellite bands; or custom wavelengths to suit individual research projects.

Sensors are suitable for use in natural solar radiation or other lamp or light sources.

As with all Skye sensors, the 2 Channel sensor has been quoted in many scientific references, please ask for a list of publications. They are compatible with Skye SpectroSense meters and DataHog loggers as well as instruments from other manufacturers.



## SKR 1840 SPECIFICATIONS

<b>Construction:</b> Housing Dupont UV resistant 'Delrin' 527UV Cosine-correcting diffuser, optical glass	<b>Cosine error (4):</b> Typically <5% to 60°
<b>Cable:</b> Screened, 3 Core military specification	<b>Azimuth error (5):</b> +/- <1%
<b>Sensor:</b> Upward looking sensor - Cosine corrected head Downward looking sensor - 25 deg, acceptance cone	<b>Longterm stability (6):</b> +/- 2%
<b>Detector:</b> Wavelength dependent	<b>Temperature range:</b> -20°C to +75°C
<b>Filters:</b> Metal interference and/or glass depending on wavelengths & bandwidths chosen	<b>Humidity range:</b> Sensor intended for outside use. In higher humidities, maintenance will be required to keep the surfaces clean
<b>Output (1):</b> Microamp output as standard. Resistors are supplied to give a mV output	<b>Weight:</b> 295g (with 3m cable and plug)
<b>Working range (2):</b> Dependant on Wavebands	<b>Dimensions:</b> 49mm (diameter) x 86mm (height)
<b>Linearity error:</b> <0.2%	<b>Mounting:</b> M6 x 7mm tapped hole in base. Sensor supplied with M6 x 16mm screw + 4x 1.5mm washers to suit panel thicknesses of 3-10mm
<b>Absolute calibration error (3):</b> typically better than 5%	

## NOTES ON SPECIFICATIONS

- (1) Current output varies from sensor to sensor. Each individual unit will have a slightly different output. A calibration certificate is supplied with each sensor
- (2) All Skye sensors will work at levels of irradiance well above that found in terrestrial sunlight conditions, room or growth chamber lighting
- (3) Main source of this error is uncertainty of calibration of Reference Lamp. Skye calibration standards are directly traceable to NPL standard references.
- (4) Cosine error to 80° is typically 5% max. Figures shown are for normal use sources, e.g., sun plus sky, diffuse sun, growth chambers, etc.
- (5) Measured at 45° elevation over 360°
- (6) Maximum change in one year. Calibration check recommended at least every two years.
- (7) Times are generally less than the figure quoted, which is in nanoseconds. They may be slightly increased if long leads are fitted, or those of a higher capacitance cable.

## ORDERING INFORMATION

### Sensors

SKR 1840D - 2 Channel sensor with diffuser for incident light (Please specify centre wavelength and bandwidth), 3m cable

SKR 1840ND - 2 Channel sensor with narrow angle for reflected light (Please specify centre wavelength and bandwidth), 3m cable

### Accessories

SKM 227S - Levelling Bracket with Off-Nadir Adjustment, short version (see separate datasheet)

SKM 227 - Levelling Bracket with Off-Nadir Adjustment (see separate datasheet)

### Meters and Dataloggers

SDL 5000 Series - DataHog2 Datalogger

SDL 5000/SD - DataHog2 with SD Storage

# SpectroSense 2+. GPS Meter for NDVI

Skye Instruments are specialist manufacturers of light and radiation sensors since 1983. The SpectroSense2 hand-held meter is a new addition to the range for use with several single sensors or with 2 and 4 channel sensors.

The SpectroSense2+.GPS is an 8-channel meter with a 4 line display for 8 light sensors or wavebands simultaneously. Readings can be displayed as individual measurements or as ratios between pairs of wavebands, e.g. Red / NIR. Direct readouts of NDVI, PRI, EVI, MSAVI, RVI, WBI, fPAR and LAI are also available (with appropriate sensor configuration).

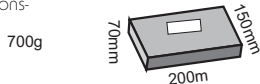
The meter features automatic datalogging and a solar radiation integration function as MJ/day solar energy. You will be able to record the measurement position using user defined labels or actual latitude and longitude via a GPS receiver. The 'Hold' button allows the user to freeze the display for easy viewing of all real time measurements. The meter's memory has storage for up to 16 calibration factors for straightforward interchange of sensors as required.

Free software is included to download the SpectroSense2+ memory to a PC. Datafiles are simple ASCII format for direct use with spreadsheets such as Excel. The range of Skye sensors for use with the SpectroSense2+ meter include PAR, red/far-red, total solar radiation, lux, UV and custom wavelength sensors. We are able to supply calibrated sensors to match most satellite wavebands.



## SPECTROSENSE SPECIFICATIONS

Construction -	Black ABS, sealed to Ip54	Measurement locations -	LABELS 100 user defined alphanumeric labels Chosen manually or auto sequential when recording measurements
Operating Range -	20 C to +70C 0-100% RH	OPTIONAL GPS MODULE	Latitude & Longitude recorded with light measurements. No subscription needed. Uses SiRF Star III chipset. Resolution typically 3m. Impossible in SBAS areas
Display and Keyboard -	20x4 line, alphanumeric liquid crystal display. 12 key Membrane keypad. Audible key press	Clock -	Real time clock powered by internal lithium battery. Ability to synchronise readings between several SpectroSense2+ meters. Will keep time without the main batteries.
Connections -	Binder sub-miniature Waterproof sockets 5 pin for sensors. 8 pin for serial RS232 PC connection (USB adaptor available)	Logging Intervals -	1, 2, 5, 10, 20, 30 seconds 1, 2, 5, 10, 20, 30 minutes 1, 2 hours Intervals >10s will be averages of 10s readings
Power -	Internal 9 volt PP3 / MNI064 / 6LF22 battery. External 12VDC power supply via RS232 socket, from solar power, mains transformer or vehicle	Modes -	A) 4 or 8 sensor / channel display B) 2 or 4 ratios display C) NDVI display D) Integration display E) Plot location labels F) GPS mode G) F1 toggles user's "favourite" display H) Log mode I) Set up mode J) Memory functions K) Download to PC
Battery Life -	- 40 - 50 hours in display mode up to 300 hours in automatic log mode 6-8 hours in GPS mode	Sensor Inputs -	6 sensor sockets Includes: 2 x 4 channel inputs + 4 x user options, OPTION 1: 4 x 2 channel current, OPTION 2: 2 x 2 channel current, 2 x 1 channel voltage, OPTION 3: 4 x 1 channel voltage.
Resolution/ Accuracy -	Resolution Minimum 16 bit 1 part in 65536. Accuracy typically 0.008% at 20°C for mid range	Weights and Dimensions-	
Input Ranges -	Current Ranges ±20nA to ±2mA Voltage ranges ±2mV to ±2V		
Memory -	Sensor library for 16 calibration factors. Non volatile EEPROM memory, no data loss if main power fails. 2000 readings of each 8 inputs stored with date, time & location		



Logging display meter for visible/NIR light sensors  
Incident & reflected light measurements  
Matched to satellite wavebands  
Direct readout of NDVI  
Logging of measurement location via GPS

## ORDERING INFORMATION

### Logging Meter

SKL 920 SpectroSense2+.GPS 4 channel logging meter

SKL 925 SpectroSense2+.GPS 8 channel logging meter

### Light Sensors

SKR 1800/SS2	2 Channel sensor
SKR 1850/SS2	4 Channel sensor
SKP 215/SS2	PAR Quantum sensor
SKS 1110/SS2	Pyranometer sensor
SKL 310/SS2	Photometric or Lux sensor
SKU 421/SS2	UVA sensor
SKU 430/SS2	UVB sensor
SKU 440/SS2	UV Index sensor
SKR 110/SS2	Red/Far-red sensor

### Accessories

SKL 910 - Hand-held pole for 1 - 6 sensors