



## SpectroSense 2 (+) Hand-Held Pole



### SKL 910 (/2 & /4)

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# SpectroSense 2 (+) Hand-Held Pole

## 1. INTRODUCTION

The SpectroSense2 display meter and SpectroSense2+ logging display meter can be used as a hand held meter, an automatic datalogger or with a hand-held pole which is ideal for simultaneous measurements of incident and reflected light and radiation.

This manual illustrates the assembly and use of the hand-held pole, e.g. for NDVI measurements.

**PLEASE BE AWARE THAT THIS PRODUCT IS NOT SUITABLE FOR CONTINUOUS OUTDOOR USE, AND SHOULD NOT BE EXPOSED TO THE ELEMENTS FOR LONG PERIODS OF TIME.**

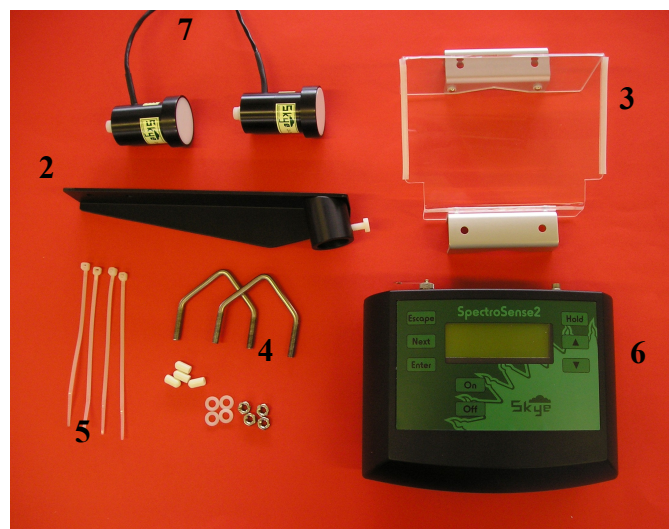
## 2. PARTS LIST

The following items are shipped as part of the hand-held pole, these will require assembly on arrival:

1. Telescopic pole
2. Mounting arm for light sensors
3. Bracket for mounting SpectroSense2 meter
4. Set of 'U' bolts for fixing bracket to pole
5. Cable ties

You will also require:

6. SpectroSense2 or 2+ meter
7. Light sensor(s)



The parts shown above will be present when the light sensors to be used have removable cosine correcting diffusers, i.e. 2-channel SKR 1800 or 4-channel SKR 1850 type sensors for incident and reflected light measurements.

If fixed diffuser sensors are to be used with the pole, e.g. SKR 110 Red / Far-Red, SKP 215 PAR Quantum, SKP 210 PAR Special, SKE 510 PAR Energy, SKL 310 Lux, SKS 1110 Pyranometer sensors etc, then the sensor mounting arm will include extra fittings to hold this type of sensor.

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## 3. ASSEMBLY

The pole should be assembled in the following order:

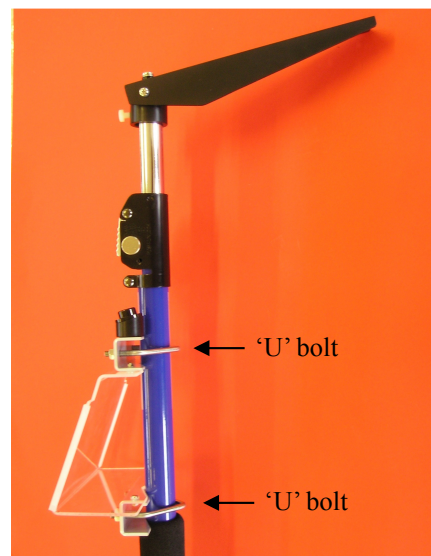
### 3.1 Mounting arm for sensors



- Remove the steel M6 screw (A), washer and spacer from the top of the pole.
- Place the round socket of the mounting arm over the top of the pole.
- Replace the steel screw (A), washer and spacer and tighten gently – but not fully yet.
- Rotate the mounting arm so that the white plastic M6 screw (B) can tighten onto the flat side of the pole. This is a only locating screw, so only requires to be finger tight.
- Fully tighten the steel screw (A)

### 3.2 Bracket for mounting the meter

- Hold the bracket for the meter against the bottom blue pole, just above the rubber handgrip.
- The level bubble should be at the top.
- Fit the 'U' bolts around the pole and through the two aluminium sections at the top and bottom of the bracket. Secure with the washers and nuts.
- Before tightening securely, position the bracket so that it is the opposite side of the pole to the sensor mounting arm, i.e. underneath the pole's silver catch.
- Do not overtighten as this may buckle the pole

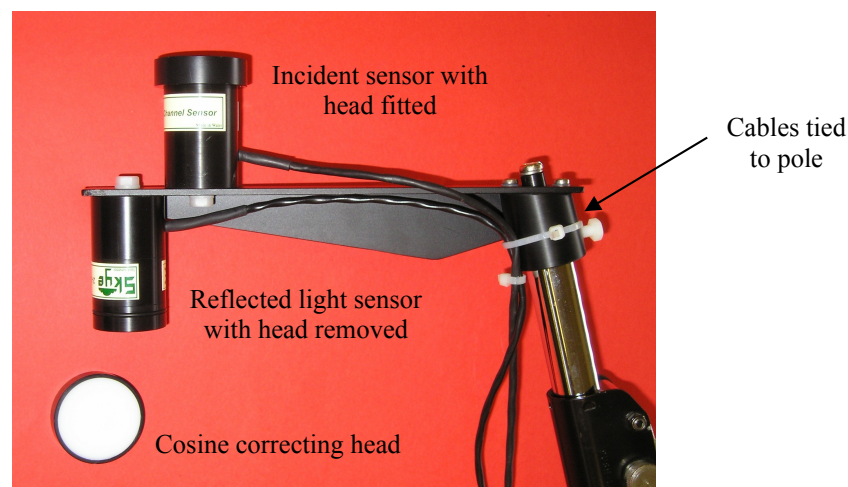


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## 3.3 Fitting the sensors

### 3.3.1 “Two Sensor” Version

#### Sensors with removable cosine correcting heads



- a) For incident or downwards coming light and solar radiation, the cosine correcting head should be in place in order to measure light from 180° hemisphere
- b) For reflected or upwards coming light and radiation, the cosine correcting head should be removed so that light is collected from a narrow angle only.
- c) The reflected or downwards facing sensor should be fitted to the end of the mounting arm, i.e. furthest away from the pole.
- d) These sensors have an M6 size threaded hole in the base and are supplied with a matching white plastic screw and washer. Use these screws to fasten the sensors in place through the 2 holes proved in the mounting arm.
- e) Use the cable ties supplied to attach the sensor cables to the top section of the pole. This will ensure they are out of the field of view of the downward looking sensor, otherwise measurement errors may occur.

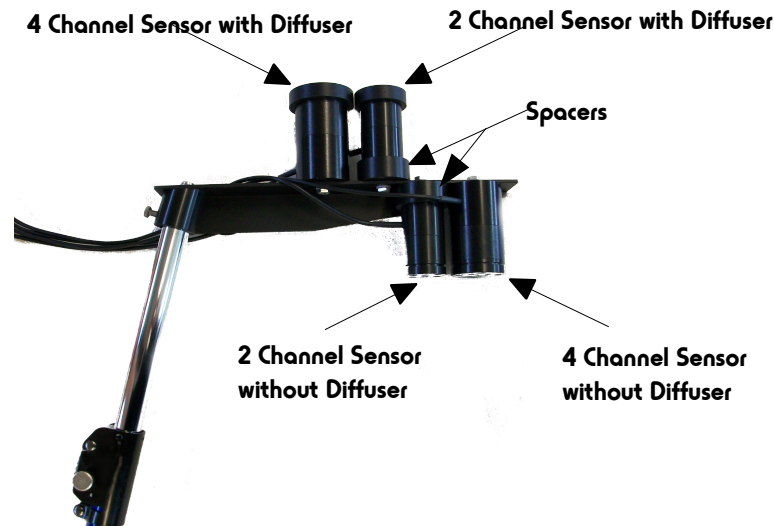
#### Sensors with fixed cosine diffusers

- a) Sensors with fixed cosine diffusing heads are suitable for measuring incident or downwards light and solar radiation only.
- b) These sensors do not have a threaded hole in the base, and so hand-held poles supplied for use with

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these sensors will be have “collars” fitted to the mounting arm in which the sensor may be clamped using the small white plastic screw.

### 3.3.2 “4 Sensor” Version



### Sensors with removable cosine correcting heads

- For incident or downwards coming light and solar radiation, the cosine correcting head should be in place in order to measure light from 180° hemisphere
- For reflected or upwards coming light and radiation, the cosine correcting head should be removed so that light is collected from a narrow angle only.
- The reflected or downwards facing sensor should be fitted to the end of the mounting arm, i.e. furthest away from the pole.
- These sensors have an M6 size threaded hole in the base and are supplied with a matching white plastic screw and washer. Use these screws to fasten the sensors in place through the holes proved in the mounting arm.
- Use the cable ties supplied to attach the sensor cables to the top section of the pole. This will ensure they are out of the field of view of the downward looking sensor, otherwise measurement errors may occur.
- There are several mounting holes to choose from in this version. The priority must be to ensure that all sensors measuring the same Field of View (FoV) should be as close together as possible. If using a combination of 2-channel and 4-channel sensors, as in the diagram above, spacers (e.g ACC/26) are required to bring the 2-channel sensors up to height. This avoids shadow/reflection effects from the taller sensor. Please see the diagram below for guidance.



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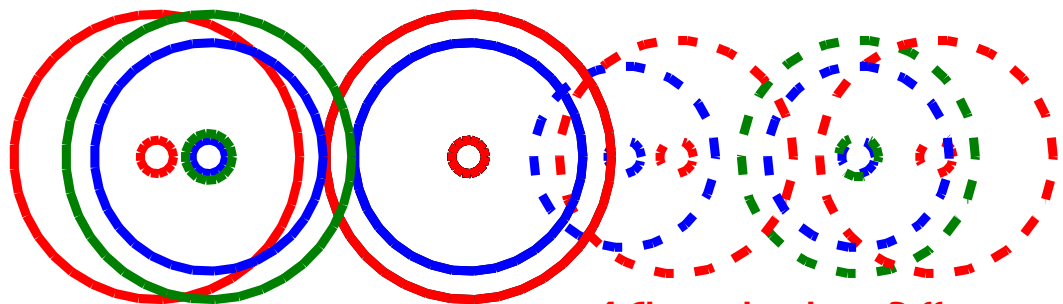
## Sensors with fixed cosine diffusers

- a) Sensors with fixed cosine diffusing heads are suitable for measuring incident or downwards light and solar radiation only.
- b) These sensors do not have a threaded hole in the base, and so hand-held poles supplied for use with these sensors will have “collars” fitted to the mounting arm in which the sensor may be clamped using the small white plastic screw.
- c) There are holes placed especially for combinations of 2/4-channel sensors with diffusers. Please see the diagram below for guidance.

**4 Channel with Diffuser**

**2 Channel with Diffuser**

**4 Channel with Diffuser when used  
with a 2 channel with diffuser**

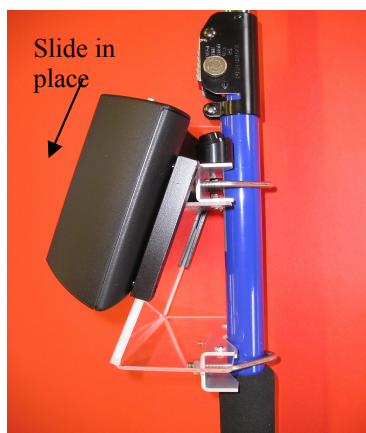


**4 Channel without Diffuser**

**2 Channel without Diffuser**

**4 Channel without Diffuser when with  
a 2 Channel without diffuser**

## 3.4 Fitting the meter



The SpectroSense2 or SpectroSense2+ meter simply slides down onto the sides of the bracket, using the U channel to locate it.



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## 4 OPERATION

The hand-held pole is intended to be used at an angle pointing away from you as shown in the photograph:

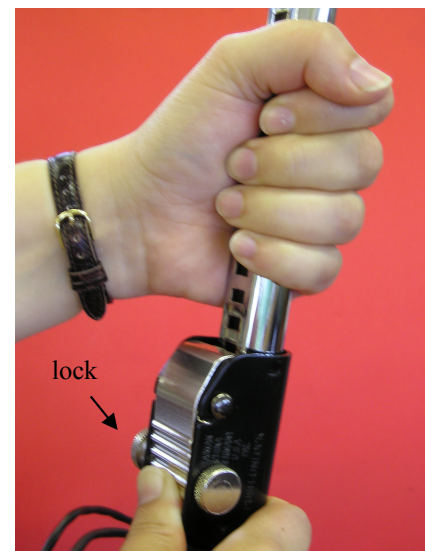


Place the base of the pole on the floor near your feet and lean the pole away from you until you can see the level bubble on the meter bracket is in the centre of the circle. The sensor mounting arm is now also horizontal and level.

Note the sensor cables are well secured to the pole to prevent interference with the reflected light measurement.

### 4.1 Extending the pole

- The telescopic pole can be extended to the required height by pressing the lower section of the silver catch as shown
- Pull up the top section of the pole, it may be a little stiff at first
- When the desired height is required, push the top section back down a little to lock the silver catch into the hole in the pole
- This position may be locked by pushing the round button sideways



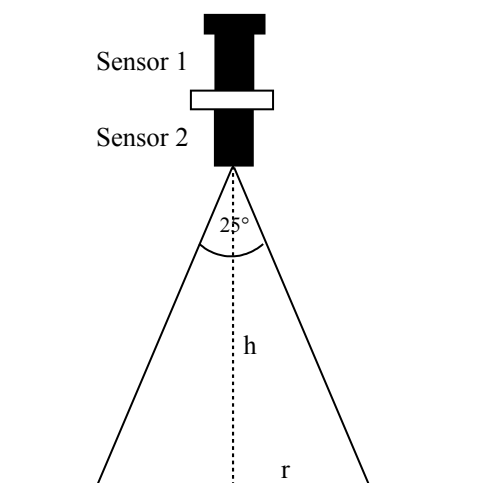
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## 4.2 Area of reflected light measurement

Skye 2 and 4 channel light sensors are fitted with a removable cosine correcting light acceptance head. When taking incident or down-welling light measurements, the head is left in place so that the sensor is fully cosine corrected (accepts light in accordance with Lambert's Cosine Law).

For the measurement of reflected or up-welling light, the cosine head is removed converting the sensor into a narrow angle acceptance instrument. The sensor has a smaller, defined field of view and can accurately measure from a defined ground area.

Without the cosine head, both 2 and 4 channel sensors have a  $25^\circ$  cone field of view ( $12.5^\circ$  off perpendicular). The area of ground in view to the sensor is then defined by the height above the ground, as shown below:



Sensor 1 is fitted with the cosine correcting head and is measuring incident light.

Sensor 2 is narrow angle and is measuring reflected light.

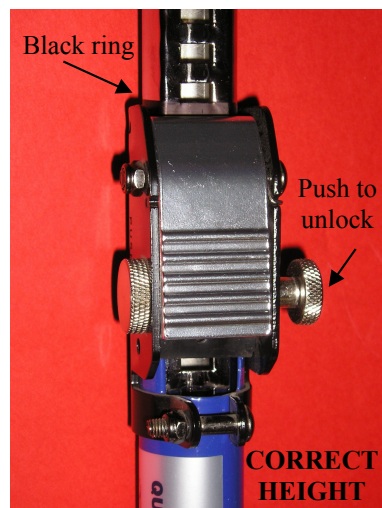
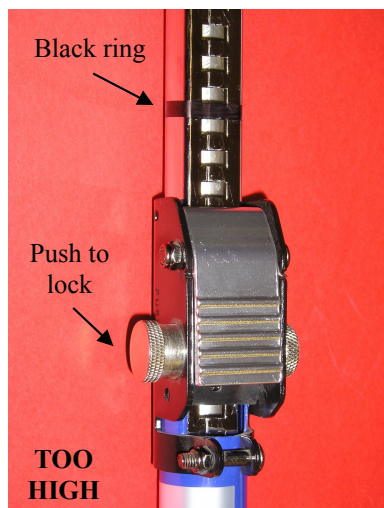
Both incident and reflected light is measured simultaneously by 2 identical sensors, to eliminate fluctuations in solar radiation

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## 5. EXAMPLES OF MEASUREMENT AREA

HEIGHT OF SENSOR $h$	RADIUS OF CIRCLE $r$	AREA OF MEASUREMENT
0.5m	0.11m	0.04m <sup>2</sup>
0.75m	0.17m	0.09m <sup>2</sup>
1m	0.22m	0.15m <sup>2</sup>
1.25m	0.28m	0.24m <sup>2</sup>
1.5m	0.33m	0.35m <sup>2</sup>
1.75m	0.39m	0.47m <sup>2</sup>
1.8m	0.40m	0.50m <sup>2</sup>
2m	0.44m	0.62m <sup>2</sup>

The hand-held pole is marked so that a height of 1.8m (giving an area of measurement of 0.5 m<sup>2</sup>) is easily achieved. When extending the pole as above, there is a black ring marked around the pole – this should be only just visible above the silver catch at the correct height.



The pole can be locked in place by pushing the round button as shown above.

# SpectroSense 2 (+) Hand-Held Pole

## 6. TROUBLESHOOTING

If you are having any problems with using your SpectroSense 2 (+) hand-held pole, please refer here. If your problems aren't addressed, do not hesitate to contact us by the following methods:

+44 (0) 1597 824 811

[skyemail@skyeinstruments.com](mailto:skyemail@skyeinstruments.com)

Alternatively, why not contact us via social media? We are on FaceBook, Twitter, Youtube, LinkedIn, and many more. Please see the inside cover of this manual for more details.

### **I cannot adjust the height of the pole.**

First of all, please check that the locking mechanism is not engaged. The locking pin is located either side of the push-clip. Please see Chapter 5.

## 7. SPECIFICATIONS

<b>Weight:</b>	2 kg
<b>Height:</b>	135cm to 250cm (adjustable)
<b>Material:</b>	Aluminium, mild steel
<b>Mountings:</b>	1 SpectroSense2 (+) & GPS  /2: 2x 1/2-ch sensors  /4: 4x 1/2 /4-ch sensors
<b>Levelling:</b>	Bubble Levelling, mimics sensor mounting arm
<b>Grip:</b>	Foam, hand level.