SunScan Canopy Analysis System

- Measures incident and transmitted PAR in plant canopies
- Direct display of Leaf Area Index (LAI)
- Unique BF5 Sunshine Sensor reference measures Direct and Diffuse components of incident light
- Usable in cloudy, clear and changeable conditions
- Portable, weatherproof and battery powered

SunScan Probe - SS1

The probe has an array of 64 PAR sensors embedded in a 1 meter long probe, and is connected via an RS-232 cable to a handheld PDA. As a reading is taken, all the sensors are scanned and the measurements are transmitted to the PDA.

The average light level along the probe is calculated, and all of the individual sensor readings are available if required for detailed PAR mapping. An operating button on the probe handle enables successive readings to be taken quickly and simply on demand. Alternatively, unattended logging can be conducted under program control from the PDA. Readings are in units of PAR quantum flux (μmol m⁻² s⁻¹) and units of LAI (m².m⁻²).

Sunshine Sensor BF5

SunScan features a unique optional reference sensor which measures the direct and diffuse components of light simultaneously above the canopy.

The special shading pattern of the dome is matched to an array of photodiodes in such a way that at least one photodiode always sees an unobstructed solar disc and at least one is always in full shadow. The BF5 uses this information to calculate whether the sun is shining and to measure the direct and diffuse components of solar radiation, avoiding the need for the shade ring adjustments required with conventional diffuse light sensors (levelling is the only adjustment required).

Data Analysis And Storage

The RPDA1 is an exceptionally robust handheld PDA which collects and analyses readings from the SunScan Probe. Raw readings, and derived functions such as LAI, can be displayed, reviewed and stored in the field by the SunData Software; groups of readings can be averaged if required.

Readings are stored in the internal memory which holds >1 million readings, or in widely available CompactFlash cards which provide removable data storage. Collected data can be transferred easily to a PC.

The SunData Software can automatically take readings and averages from the SunScan Probe, at user-defined intervals from 1 second to 24 hours. This can be used for example to obtain diurnal readings of canopy light interception at a particular location.

SunScan Probe Specifications

- **Active Area**: 1 m x 13 mm wide; sensor spacing 15.6 mm
- **Spectral response**: 400 - 700 nm (PAR)
- **Measurement time**: 120 ms
- **Maximum reading**: 2500 μmol.m⁻².s⁻¹
- **Resolution**: 0.3 μmol.m⁻².s⁻¹
- **Linearity**: Better than 1%
- **Accuracy**: ±10%
- **Analogue output**: 1 mV per μmol.m⁻².s⁻¹
- **Serial interface**: RS-232, 9 pin female ‘D’ connector
- **Environmental**: IP65, 0 - 60° C working temp
- **Size (mm) & Weight**: 1,300 (l) x 100 (w) x 130 (h), 1.7kg
- **Power**: Four AA Alkaline cells (lifetime up to 1 year)

Rugged PDA type RPDA1

- **Screen**: ¼ VGA sunlight readable
- **Operating system**: Windows Mobile 6
- **Display options**: a) LAI, b) PAR average, c) ALL individual sensor readings
- **Environmental**: IP67, -30 °C to 60 °C, 1.2 m drop test
- **Power**: Rechargeable battery, 12h continuous use
- **Memory**: >100 MB available
- **Size & Weight**: 165 mm x 95 mm x 45 mm, 450g
### BF5 Specifications

**Accuracy:**
- Sunshine hours: ±10% (WMO definition)
- Cosine correction: ±10% of incoming radiation over 0 - 90° Zenith angle
- Azimuth angle: ±5% over 360° rotation
- Temperature coefficient: ±0.15% /°C typical
- Temperature range:
  - -20 to + 50°C, Alkaline batteries
  - -20 to + 70°C, Lithium batteries
- Recommended recalibration interval: 2 years
- Response time: < 250ms
- Spectral response: 400 - 700nm
- Latitude capability: -90° to + 90°

**Environmental:**
- Sealing: IP65 (shower and dust proof)
- Sunshine status: contact closure
- No sun = open circuit; Sun = short circuit to ground

**Internal battery:**
- 2 x 1.5V AA Alkaline batteries

**Power requirement:**
- 2mA, (awake), <30mA (asleep)

**Battery lifetime:**
- 1 year typical

**Size & Weight:**
- 120mm x 122mm x 95mm, 635g

**Heater output below 0°C:**
- 15 W

**Heater output above 5°C:**
- 2W reducing to 0W at 35°C

**Lowest snow & ice-free temperatures:**
- -20°C at 0 m/s wind speed
- -10°C at 2 m/s wind speed

**Heater: max power:**
- 15 W at 12V DC

### System Type Features and Advantages

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<tr>
<th>System Type</th>
<th>Features and Advantages</th>
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<tr>
<td>SunScan Complete System type SS1-COM.</td>
<td>The Recommended Plus System provides a powerful canopy analysis tool. It can calculate instant estimates of LAI, measure PAR interception using spot readings or with unattended logging and measure sunflecks. A major advantage for field use is that the BF5 Sunshine Sensor needs minimal adjustment during use.</td>
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<td>SunScan Standard System type SS1-ENTRY.</td>
<td>The Standard System is able to make the full range of SunScan measurements, including LAI. However, as the SunScan Probe has to be used as its own above canopy reference, it can only be used in steady light conditions: blue sky or evenly overcast.</td>
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