Delta-T Devices

SPN1 Pyranometer Performance

including BF5 / SPN1 Comparison

Comparison of Delta-T Devices SPN1 Sunshine Pyranometer and BF5 Sunshine Sensor

The SPN1 is an advanced version of the BF5, so the two instruments have many features in common. There are, however, some important differences, as summarised in the table below.

Function / Feature	BF5	SPN1
Pyranometer	*Accuracy (hourly averages)* *Total(Global):* ±12% ±10 μmol.m^{-2}.s^{-1} Diffuse: ±15% ±10 μmol.m^{-2}.s^{-1} *Range*: 0 to 1250 W.m^{-2} *Spectral response:* 400-700 nm	Conforms to most criteria for WMO Good Quality Pyranometer classification (see next page). *Accuracy*: *Total(Global)and Diffuse* ±5% Daily integrals ±5% ±10 W.m^{-2} Hourly averages ±8% ±10 W.m^{-2} Individual readings: *Range*: 0 to >2000 W.m^{-2} *Spectral response:* ±10% 400-2700 nm
Construction	Moulded acrylic dome, ABS body, photodiode sensors.	Meteorological grade instrument, precision ground glass dome, solid aluminium body, high quality connectors, thermopile sensors.
Output units	Choice of units: PAR (μmol.m^{-2}.s^{-1}), Energy (W.m^{-2}), or Lux. *The BF5 measurement is in molar units, other outputs are derived from this.*	Energy (W.m^{-2}) units only
Use with SunScan	Designed for use with Delta-T SunScan Canopy Analysis System	Unsuitable for use with SunScan
Other applications	The SPN1 is designed primarily for collecting high quality meteorological data whereas the BF5 was designed originally as a PAR reference sensor for the SunScan System. The BF5's alternative outputs (Lux and Energy) enable it to be used in the study of photosynthesis, illumination and solar energy, subject to a wider tolerance on accuracy. The BF5 can also be used in building energy management systems (BEMS).	
Cost	The SPN1 is a high specification, meteorological grade instrument with a price that reflects its quality. The BF5 is more affordable and well suited to many less demanding research applications, as well as control applications.	

Please note that the above table only compares the points of difference – it is not intended to be a complete product comparison. See also Comparison of SPN1 with WMO and ISO pyranometer standards on next page.

Delta-T Devices Ltd
130 Low Road, Burwell, Cambridge, CB25 0EJ, UK
tel: +44 1638 742922 sales@delta-t.co.uk www.delta-t.co.uk

Comparison of SPN1 with WMO and ISO pyranometer standards

		ISO: Secondary Standard	ISO: First Class		
		WMO: High Quality	WMO: Good Quality	SPN1	Notes
Response time	ISO & WMO	< 15 s	< 30 s	0.1 s	To 95% of final value (Actual response time is 100ms)
Zero off-set response:	ISO & WMO	7 W/m^2	15 W/m^2	<3 W/m^2	To 200 W/m^2 net radiant loss to sky (ventilated)
Zero off-set response:	ISO & WMO	±2 W/m^2	±4 W/m^2	<3 W/m^2	For 5°C/hr change in ambient temperature
Resolution	WMO	±1 W/m^2	±5 W/m^2	0.6W/m^2	Smallest detectable change
Non-stability:	ISO & WMO	±0.8%	±1.5%	<1.0%	Change in sensitivity per year
Non-linearity:	ISO & WMO	±0.5%	±1%	<1%	Deviation from sensitivity at 500 W/m^2 over 100 to 1000 W/m^2 range
Directional response:	ISO & WMO	±10 W/m^2	±20 W/m^2	±20 W/m^2	Error due to assuming that the normal incidence response at 1000 W/m^2 is valid for all directions
Spectral selectivity	ISO (0.35–1.5 µm) WMO (0.30–3.0 µm)	±3% ±2%	±5% ±5%	±10% (0.4-2.7 µm)	Deviation of the mathematical product of spectral absorptance and transmittance from the mean
Temperature response:	ISO & WMO	±2%	±4%	±1%	Error due to 50°C ambient temperature change
Tilt response:	ISO & WMO	±0.5%	±2%	See note *	Deviation from horizontal responsivity due to tilt from horizontal to vertical at 1000 W/m^2
Achievable uncertainty:	WMO hourly totals WMO daily totals	3% 2%	8% 5%	5% ±10W/m^2 5%	95% confidence level

* Believed to be <2%, not yet clearly measured.