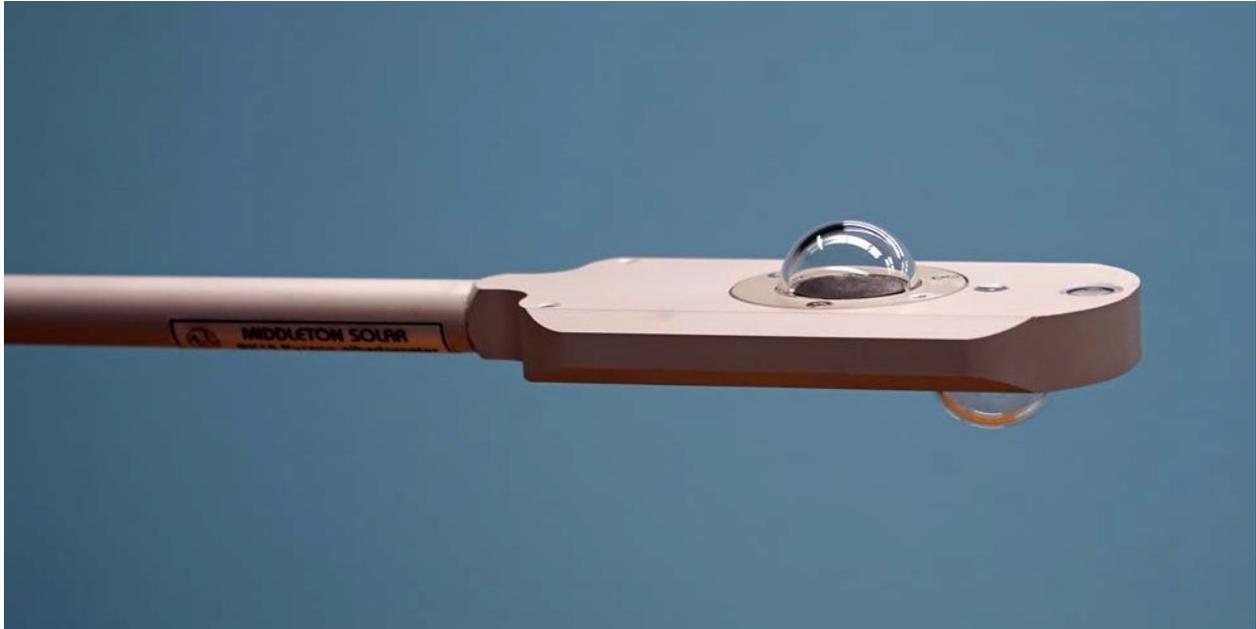




MIDDLETON SOLAR
SK16 PYRANO-ALBEDOMETER
APPLICATION NOTE

CE 2021



The Middleton Solar SK16 Pyrano-albedometer is for measuring albedo, the ratio of upward to downward solar radiation through a horizontal plane. The SK16 has separate upper and lower thermoelectric sensors each shielded by a glass dome window. The domes are transparent to shortwave solar radiation from the sun (top sensor), and shortwave reflected from the Earth surface (bottom sensor). The sensors are matched for response time, and their collector surfaces are parallel.

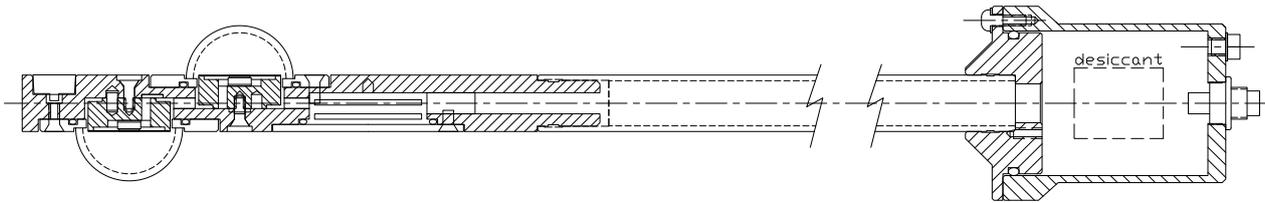
Installation. Select a site that is level with an unobstructed view of the sky and the ground. The directional nature of the solar beam means that a surface that slopes toward the sun will receive more radiation than a level surface and thus make the albedo appear too high. Secure the handle and adjust so the instrument is horizontal, approximately 1-2m above the ground, with the bubble level (top side) facing upwards. If the ground is rough or non-uniform then mount the SK16 as high as possible to integrate the effect of the surface features. The available *3-Axis Clamp* can facilitate mounting to a flat plate.

Connect the SK16 output lead to a data acquisition system; use differential inputs.

output lead cores	top signal +ve	red
	top signal -ve	blue
	bottom signal +ve	yellow
	bottom signal -ve	green

The output signal from each sensor is a passive analogue voltage, with the top sensor ranging up to 30mV on a bright summer day.

Maintenance. Keep the domes clean and free from debris; use only water and mild detergent. Calibration every two years is recommended, at which time the desiccant should be replaced.



Technical Specification

sensitivity (typical), two outputs	10 $\mu\text{V}/\text{W}\cdot\text{m}^{-2}$
viewing angle	4π steradians
spectral range	0.3 to 3 μm
maximum irradiance	2,000 $\text{W}\cdot\text{m}^{-2}$
fullscale output (typical)	30mV (at 1,500 $\text{W}\cdot\text{m}^{-2}$)
resolution	$\pm 2 \text{ W}\cdot\text{m}^{-2}$
calibration traceability	WRR (World Radiometric Reference)
spectral selectivity	$< \pm 3\%$
response time (95%)	7s (typical)
Impedance, two outputs	20 Ω
operating temperature	-35 to +60°C
non-linearity	$< \pm 1\%$
non-stability (change/year)	$< -0.5\%$
temperature dependence of sensitivity	$< 2\%$ (-30 to +50°C)
thermal radiation offset (200 $\text{W}\cdot\text{m}^{-2}$)	$< 4 \text{ W}\cdot\text{m}^{-2}$
temperature gradient offset (5°C /hr)	$< 4 \text{ W}\cdot\text{m}^{-2}$
directional response (w.r.t 1,000 $\text{W}\cdot\text{m}^{-2}$)	$< \pm 20 \text{ W}\cdot\text{m}^{-2}$ (0-80°)
tilt response	$< \pm 1\%$
uncertainty in daily total (95% level)	$< 5\%$
level accuracy	0.4°
desiccant (in handle)	orange silica gel (non-toxic)
sensors	thermopile, flat black receiver
windows	glass dome, $\text{Ø}30\text{mm}$
output lead	6m, with in-line connector at handle
construction	anodized aluminium; stainless steel
IP rating	sealed to IP66
dimensions & weight	head 66x40x130mm; handle $\text{Ø}16\text{x}640$; 0.5kg
shipping size & weight	$\text{Ø}90 \times 850\text{mm}$; 1kg

Available Options

3-Axis Clamp (for mounting to a flat plate), P/N 123.9100

