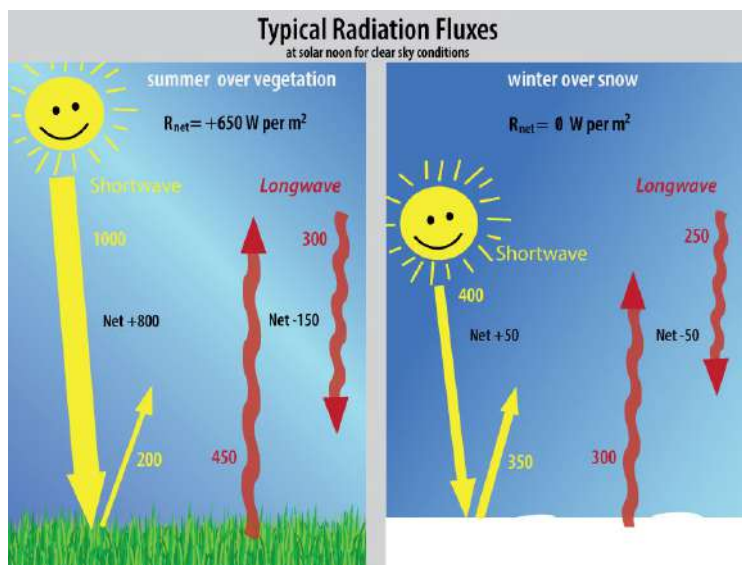




Radiation Fluxes



Net radiation is the sum of the four components shown to the left (incoming shortwave, outgoing shortwave, incoming longwave, outgoing longwave). Incoming shortwave incident on the surface is either reflected or absorbed by the surface material, and longwave radiation is emitted from the surface and emitted from the molecules of air in the atmosphere. Typical clear sky summer fluxes over grass and clear sky winter fluxes over snow are shown. A typical summer flux at solar noon would be $+650 \text{ W m}^{-2}$; in winter it would be 0 W m^{-2} .

Product Specifications

	SN-500-SS	SN-522-SS
Input Voltage Range	5.5 to 24 V DC (heaters are optimized to run at 12 V DC)	
Output Type	SDI-12	Modbus
Current Draw (12 V DC Supply Voltage)	Heaters on, communication enabled: 63 mA; Heaters off, communication enabled: 1.5 mA; Heaters off, communication disabled: 0.6 mA	Heaters on: 72 mA; Heaters off: 13.5 mA
Response Time	1 s (SDI-12 data transfer rate; detector response times are 0.5 sec)	It takes 750 ms to digitize all detector signals
Heaters (sensors individually heated)	62 mA current draw and 740 mW power requirement at 12 V DC	
Operating Environment	-50 to 80 °C; 0 to 100 % relative humidity	
Dimensions	116 mm length, 45 mm width, 66 mm height	
Mass	320 g (with mounting rod and 5 m of lead wire)	
Cable	M8 connector (IP68 rating) to interface to sensor housing; 5 m of four conductor, shielded, twisted-pair wire in a TPR jacket with pigtail lead wires	
Warranty	4 years against defects in materials and workmanship	

Features

TYPICAL APPLICATIONS

Net radiation is a key variable in the surface energy balance and influences turbulent fluxes, including evapotranspiration. Applications include measurements on flux towers and weather stations.

DIGITAL OUTPUT

An on-board 24-bit analog to digital converter makes measurements and provides a digital SDI-12 (SN-500) or Modbus (SN-522) output. This eliminates the need for multiple analog datalogger channels to measure each of the four components of net radiation.

HIGH ACCURACY

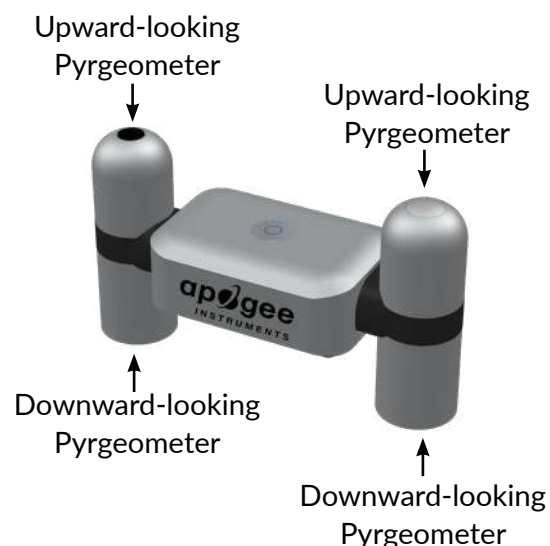
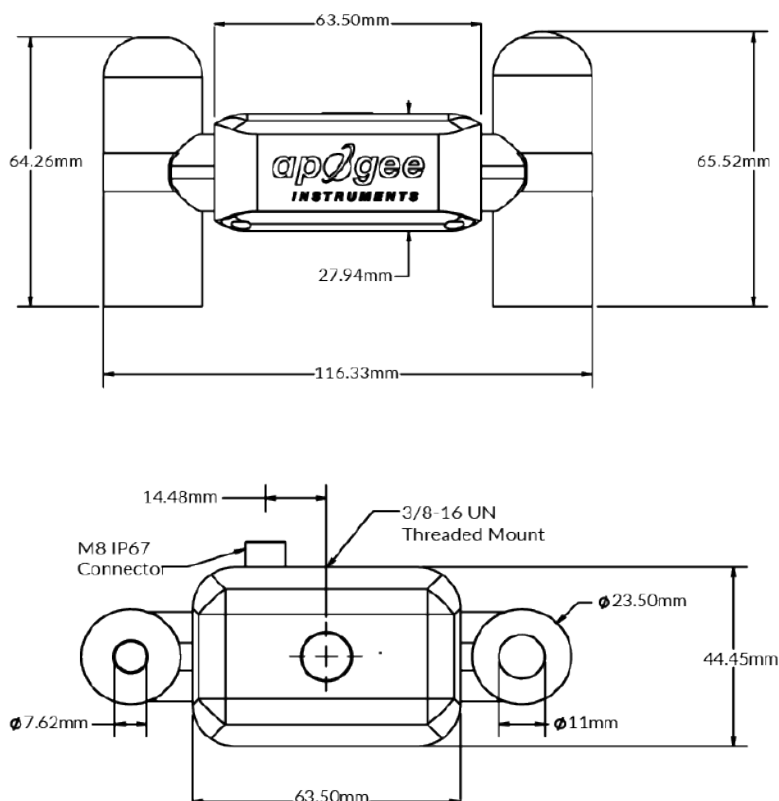
Measure all four components of net radiation with a digital output that saves datalogger channels. Comparable accuracy to industry-leading competition in long-term field testing.

COMPACT & LIGHTWEIGHT

The small lightweight design enables easy mounting to a cross arm using the AM-500 mounting bracket, which facilitates precision leveling.

HEATED SENSORS

Each sensor includes a 0.2 W heater to minimize errors from dew, frost, rain, and snow that can block the radiation path.



Product Specifications

SL-500 Series Pyrgeometers	
Sensitivity	0.12 mV per $W m^{-2}$ (variable from sensor to sensor, typical value listed)
Calibration Factor (Reciprocal of Sensitivity)	8.5 $W m^{-2}$ per mV
Calibration Uncertainty	$\pm 5 \%$
Measurement Range	-200 to 200 $W m^{-2}$ (net longwave irradiance)
Measurement Repeatability	Less than 1 %
Long-term Drift	Less than 2 % change in sensitivity per year
Non-linearity	Less than 1 %
Response Time	Less than 0.5 s
Field of View	180° (upward); 150° (downward)
Spectral Range	5 to 30 μm (50 % points)
Temperature Response	Less than 5 % from -15 to 45 C
Window Heating Offset	Less than 10 $W m^{-2}$
Zero Offset B	Less than 5 $W m^{-2}$
Tilt Error	Less than 0.5 %
Uncertainty in Daily Total	$\pm 5 \%$
Temperature Sensor	30 k Ω thermistor, ± 1 C tolerance at 25 C
Output from Thermistor	0 to 2500 mV (typical, other voltages can be used)
Input Voltage Requirement for Thermistor	2500 mV excitation (typical, other voltages can be used)

SP-500 Series Pyranometers	
Sensitivity (variable from sensor to sensor)	0.045 mV per $W m^{-2}$ (upward); 0.035 mV per $W m^{-2}$ (downward); (typical values listed)
Calibration Factor (Reciprocal of Sensitivity)	22 $W m^{-2}$ per mV (upward); 28.5 $W m^{-2}$ per mV (downward)
Calibration Uncertainty	Less than 3 % at 1000 $W m^{-2}$
Output Range	0 to 90 mV (upward); 0 to 70 mV (downward)
Measurement Range	0 to 2000 $W m^{-2}$ (net shortwave irradiance)
Measurement Repeatability	Less than 1 %
Long-term Drift	Less than 2 % per year
Non-Linearity	Less than 1 %
Detector Response Time	0.5 s
Field of View	180° (upward); 150° (downward)
Spectral Range	385 nm to 2105 nm (upward); 370 to 2240 nm (downward)
Directional (Cosine) Response	Less than 30 $W m^{-2}$ at 80° solar zenith (upward); Less than 20 % for angles between 0 to 60° (downward)
Temperature Response	Less than 5 % from -15 to 45 C
Zero Offset A	Less than 5 $W m^{-2}$; less than 10 $W m^{-2}$ (heated)
Zero Offset B	Less than 5 $W m^{-2}$
Uncertainty in Daily Total	Less than 5 %