INFRARED RADIOMETERS | SI-100-SS, SIF-100-SS, & SI-410-SS Series

Ultra Narrow	Narrow	Standard	Horizontal
14° half-angle	18° half-angle	22° half-angle	13° x 32° half-angles

High accuracy non-contact surface temperature measurement

Features

Output Options
- Analog response
- SDI-12
- or hand-held meter

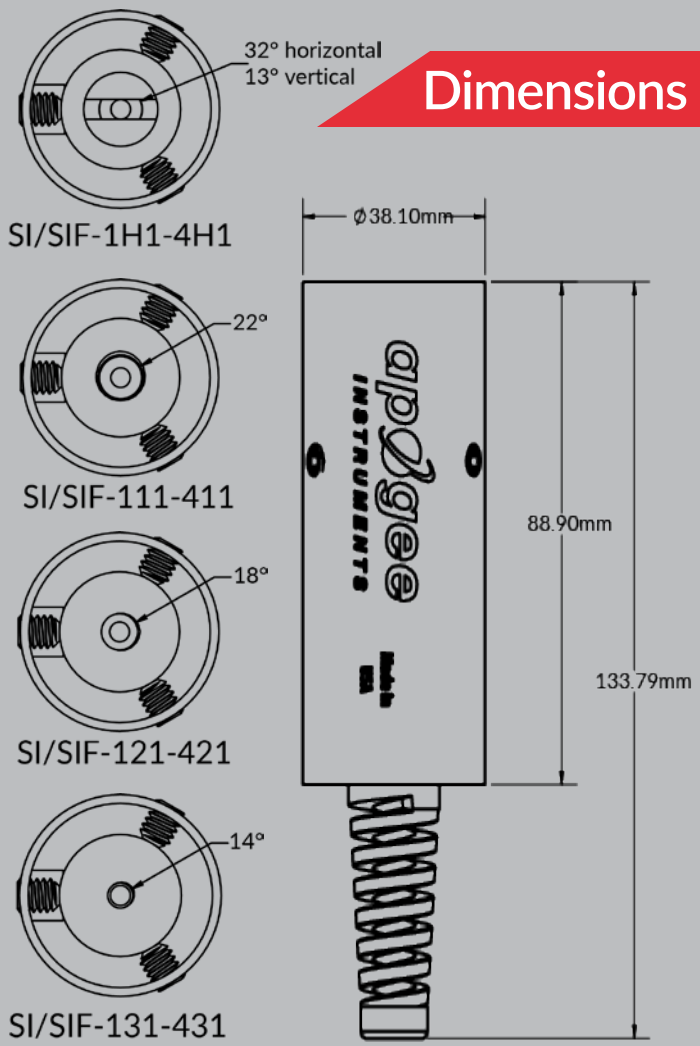
High Speed Options
New fast response (SIF) analog models have a 0.2 second response time.

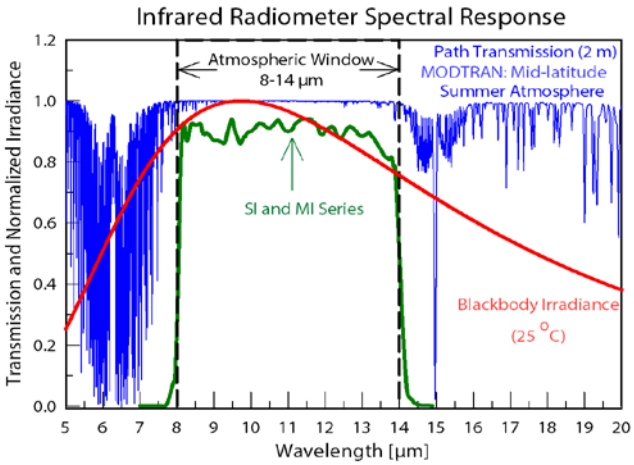
High Accuracy
Calibrated to a custom black-body cone with a measurement uncertainty of ± 0.2 C from -30 to 65 C when the sensor temperature is within 20 C of the target. Radiometers are only sensitive to wavelengths from 8 to 14 µm to minimize the influence of water vapor and CO_2 on the measurement.

Rugged Housing
Anodized aluminum body with fully-potted electronics. The outer radiation shield reduces thermal fluctuations.

Typical Measurement Applications
- Plant water status estimation
- Road surface temperature measurement for determination of icing conditions
- Terrestrial surface (soil, vegetation, water, snow) temperature measurement in energy balance studies

Dimensions





Left: Spectral response of SI series infrared radiometers. Spectral response (green line) is determined by the germanium filter and corresponds closely to the atmospheric window of 8 to 14 µm, minimizing interference from atmospheric absorption/emission bands (blue line) below 8 µm and above 14 µm. Typical terrestrial surfaces have temperatures that yield maximum radiation emission within the atmospheric window, as shown by the blackbody curve for a radiator at 25 C (red line).

Calibration Traceability

An Infrared Radiometer (IRR) combines a thermopile detector and a National Institute of Standards and Technology (NIST) traceable thermistor to measure a mV response proportional to the thermal radiation balance between the target temperature and the thermopile temperature. IRRs are placed in a temperature controlled housing, which is thermally insulated from a blackbody cone. The housing, pointed at a blackbody cone, is temperature cycled through various sensor body set-points. The blackbody cone temperature is likewise cycled through multiple temperature set-points relative to each sensor body temperature set-point. A linear fit is used to model each sensor body set-point with the respective blackbody cone set-points versus the thermopile signal at those set-points. The slopes and y-intercepts of all linear fits corresponding to each sensor body temperature are then fit to a second order polynomial to adequately interpolate between the calibrated set-points. These two sets of second order polynomial coefficients render the custom calibration coefficients for each sensor.

Product Specifications

All Models -SS	SI-111	SI-121	SI-131	SI-1H1	SIF-111	SIF-121	SIF-1H1	SI-411	SI-421	SI-431	SI-4H1
Analog Model Output (Difference between Target and Detector)	≈ 60 µV per C	≈ 40 µV per C	≈ 20 µV per C	≈ 40 µV per C	≈ 15 µV per C	≈10 µV per C		Digital Models (SDI-12)			
Input Voltage Requirement	2500 mV thermistor excitation (typical, other voltages can be used)							5.5 to 24 V DC with current draw of 1.5 mA (quiescent), 2.0 mA (active)			
Analog Output from Thermistor	0 to 2500 mV (typical, depends on input voltage)							—			
Calibration Uncertainty (-20 to 65 C), when target and detector ΔT are < 20 C	0.2 C		0.3 C	0.2 C						0.3 C	0.2 C
Calibration Uncertainty (-40 to 80 C), when target and detector ΔT are > 20 C	0.5 C		0.6 C	0.5 C						0.6 C	0.5 C
Measurement Repeatability	Less than 0.05 C										
Long-term Drift	Less than 2 % change in slope per year when germanium filter is maintained in clean condition										
Response Time	0.6 s, time for detector signal to reach 95 % following a step change				0.2 s, time for detector signal to reach 95 % following a step change			0.6 s, time for detector signal to reach 95 % following a step change			
Field of View (half-angle)	22°	18°	14°	32° horizontal; 13° vertical	22°	18°	32° horizontal; 13° vertical	22°	18°	14°	32° horizontal; 13° vertical
Spectral Range	8 to 14 µm; atmospheric window										
Operating Environment	-55 to 80 C; 0 to 100 % relative humidity (non-condensing)										
Dimensions	23 mm diameter, 60 mm length										
Cable	5 m of four conductor, shielded, twisted-pair wire; TPR jacket (high water resistance, high UV stability, flexibility in cold conditions); pigtail lead wires; stainless steel (316), M8 connector located 25 cm from sensor head										
Mass	190 g (with 5 m of lead wire)										
Warranty	4 years against defects in materials and workmanship										