

## Measure net shortwave and net longwave radiation



A net radiometer measures the difference between incoming and outgoing radiation (both shortwave and longwave components), in  $\text{W m}^{-2}$ , for the surface the sensor is mounted over. The CNR 2 net radiometer (manufactured by Kipp & Zonen B.V., Delft, The Netherlands) measures net shortwave and net longwave radiation separately via individual shortwave and longwave sensors. The shortwave and longwave sensors each have upward and downward facing radiation detectors; the two shortwave signals from the detectors are combined at the shortwave sensor, as are the two longwave radiation signals at the longwave sensor. As a result, there are two outputs, one proportional to net shortwave radiation and the other proportional to net longwave radiation. The calibration of shortwave is traceable to the world shortwave radiation references in Davos, Switzerland.

*\*Blonquist Jr., J.M., B. Bugbee, and B.D. Tanner, 2009. Evaluation of measurement accuracy and comparison of two new and three traditional net radiometers. Agricultural and Forest Meteorology 149:1709-1721.*

CNR 2 net radiometer performance was tested relative to multiple net radiometer models in a recent study\*; replicate CNR 2 net radiometers were highly accurate under the conditions of the study.

CNR 2 net radiometers feature a compact, lightweight design that facilitates mounting.

Applications include net radiation measurement in surface energy balance studies, particularly water and carbon cycling studies in:

- agriculture
- ecology
- hydrology
- biogeochemistry

## Related Product



### SP-110

The pyranometer sensor is calibrated to measure the shortwave radiation reaching the Earth's surface.

# Specifications

## Range

- Pyranometer: 0 to 4000 W m<sup>-2</sup>
- Pyrgeometer: -250 to 250 W m<sup>-2</sup>

## Non-Linearity

- Pyranometer: (0 to 1000 W m<sup>-2</sup>) < 2%
- Pyrgeometer: (-250 to 250 W m<sup>-2</sup>) < 1%

## Zero Offset

- Pyranometer: < 15 W m<sup>-2</sup>

## Directional Error

- < 20 W m<sup>-2</sup>

## Response Time 95%

- 10 s

## Temperature Error

- (-10 to 40 C) < 5%

## Spectral Range

- Pyranometer: 0.31 to 2.8 μm
- Pyrgeometer: 4.5 to 42 μm

## Field of View

- Pyranometer: Upper - 180°, Lower - 150°
- Pyrgeometer: Upper - 150°, Lower - 150°

## Sensor Asymmetry

- < 5%

## Sensitivity

- 10 to 20 μV per W m<sup>-2</sup> (for both shortwave and longwave)

## Annual Sensitivity Change

- < 1%

## Tilt Error

- < 1%

## Uncertainty in Daily Total

- < 10%

## Operating Environment

- -40 to 80 C
- Designed for continuous outdoor use

## Dimensions

- 4 x 20 x 7 cm long; 30 cm mounting rod

## Mass

- 250 g (+300 g for 10 m cable)

## Cable

- 10 meters

## Warranty

- 1 year against defects in materials and workmanship



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