

# CNR4

## Kipp & Zonen's Net Radiometer

The CNR4 Net Radiometer measures the energy balance between incoming short-wave and long-wave infrared radiation versus surface-reflected short-wave and outgoing long-wave infrared radiation. It consists of a pyranometer and pyrgeometer pair that faces upward and a complementary pair that faces downward. The pyranometers and pyrgeometers measure short-wave and long-wave infrared radiation, respectively.

The upper long-wave detector of the CNR4 has a meniscus dome that allows water droplets to easily roll off of it. The dome shape also increases the field of view to nearly 180° instead of 150° for a flat window.

The CNR4 contains both an internal thermistor and an internal Pt-100 RTD. Typically, the thermistor makes the instrument housing temperature measurements used to compensate the infrared readings. The RTD can also provide these measurements if a CR3000 or CR5000 datalogger is used.

The CNR4 has a solar shield that reduces the thermal effects on both the short-wave and long-wave measurements. A drying cartridge helps keep the radiometer's electronics dry. The CNF4, an optional ventilation unit with heater, can be fitted onto the CNR4 to minimize the formation of dew as well as melt frost.

### Mounting

To avoid shading and to promote spatial averaging, the CNR4 should be mounted at least 1.5 m above the ground and away from obstructions. It can be attached to a vertical pipe or horizontal crossarm (CM202, CM204, or CM206). To do this, first connect the radiometer to its mounting rod. The mounting rod then attaches to the pipe or crossarm via the 26120 Net Radiation Sensor Mounting Kit. The kit includes adjustment screws for leveling the CNR4.



### Ordering Information

#### Net Radiometer and Ventilation Unit

- CNR4 -L** Kipp & Zonen Net Radiometer with user-specified cable lengths. Enter the cable length, in feet, after the -L. Must choose a cable termination option (see below).
- CNF4** Optional ventilation unit with heater. Must choose a cable termination option (see below).

#### Cable Termination Options for CNR4 & CNF4 (choose one)

- PT** Cable terminates in stripped and tinned leads for direct connection to a datalogger's terminals.
- PW** Cable terminates in connector for attachment to a prewired enclosure.

#### Mounting Kit and Replacement Parts

- 26120** Net Radiation Sensor Mounting Kit.
- 26006** CNR4 Replacement Drying Cartridges (limited shelf life); should be replaced every 6 to 12 months.
- 26010** CNF4 Replacement Fan Filters (set of 5).



Above is a CNR4 net radiometer fitted with a CNF4 heater/ventilator unit. The CNF4 provides efficient air-flow over the domes.

## Specifications

### Spectral Response

Pyranometer: 305 to 2800 nm  
 Pyrgeometer: 4.5 to 42  $\mu\text{m}$

**Response Time:** <18 seconds

### Temperature Dependence

**of Sensitivity:** <4% (-10° to + 40°C)

**Sensitivity Range:** 5 to 20  $\mu\text{V W}^{-1} \text{m}^2$

### Output Range (typical for atmospheric applications)

Pyranometer: 0 to 15 mV  
 Pyrgeometer:  $\pm 5$  mV

**Non-Linearity:** <1%

**Tilt Error:** <1%

### Uncertainty in Daily Total

Pyranometer: < 5% (95% confidence level)  
 Pyrgeometer: <10% (95% confidence level)

**Directional Error:** <20  $\text{W m}^{-2}$  (pyranometer);  
 angles up to 80° with  
 1000  $\text{W/m}^2$  beam radiation

**CE Compliance:** Conforms to the CE guideline  
 89/336/EEC 73/23/EEC

**Operating Temperature:** -40° to 80°C

**Weight (without cable):** 30.0 oz (850 g)

### Datalogger Requirements

**Radiation Components:** 4 differential channels or  
 4 single-ended channels  
**Thermistor:** 1 voltage excitation channel  
 and 1 single-ended channel  
**Pt-100 RTD:** 1 current excitation channel  
 and 1 differential channel

**Compatible Dataloggers:** CR1000, CR3000, and CR5000  
 have sufficient channels  
 to measure the radiation  
 components and thermistor.  
 A CR3000 or CR5000 should  
 be used if measuring the  
 internal Pt-100 RTD.

**Ships With:**  
 (1) Mounting Rod from original  
 manufacturer  
 (2) # 26006 Drying cartridges  
 (2) WRR Traceable Calibration  
 Certificates  
 (1) Extra Calibration Sticker from  
 original manufacturer (for  
 CNF4 if used)

