CNR4

Kipp & Zonen's Net Radiometer

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WHEN MEASUREMENTS MATTER

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 Filter (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 µm

Response Time: <18 seconds

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

Sensitivity Range: 5 to 20 µV W^{-1} m^2

Output Range (typical for atmospheric applications)
- **Pyranometer:** 0 to 15 mV
- **Pyrgeometer:** ±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 W m^{-2} (pyranometer); angles up to 80° with 1000 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 single-ended 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)