



**CNR1**

Kipp & Zonen offers a complete range of net radiometers for the measurement of incoming and outgoing short-wave (0.3 to 3  $\mu\text{m}$ ) and long-wave (4.5 to >40  $\mu\text{m}$ ) radiation. All types are virtually maintenance free and designed for continuous outdoor use. All instruments have a linear mV output and require no power (apart from the heater in the CNR 1). They all come with a mounting rod, bubble level, instruction sheet and calibration certificate; and meet CE requirements.

The main applications are in agrometeorology, for the study of evapotranspiration and crop damage prevention; and in climatology, meteorology and hydrology for measurement of the radiation balance. Monitoring over glaciers and ice fields is of particular interest to global warming studies. In renewable energy the heat exchange in thermal solar systems can be monitored.

CNR1 combines two thermopile pyranometers for solar radiation measurement (incoming / reflected / albedo / balance) with two thermopile pyrgeometers for far infrared measurement (balance / ground surface temperature / sky temperature). There are four separate signal outputs and the integrated temperature sensor can be used to calculate the downward FIR radiation.

Via a data logger the temperature signal can be used to control the built-in heating element to minimize dew and frost deposition.

CNR 1 is the best net radiometer for accurate and reliable measurements and is often used as the reference instrument for a network of lower performance net radiometers. For the CNR1 a heated ventilation unit, the CNRV, is available to further minimize offsets and maximize stability.

CNR 2 is a unique design and features two separate outputs for net short-wave (solar) and net long-wave (atmospheric and terrestrial) radiation. The glass domes and silicon windows protect the two differential thermopile detectors from environmental factors, are easy to clean and minimize the effects of wind and rain. CNR 2 is supplied as standard with a high quality waterproof connector and 10 m signal cable.



**CNR2**

The compact, rugged and lightweight construction with removable mounting rod makes the CNR 2 ideal for portable field research as well as for network use.

**NR LITE**



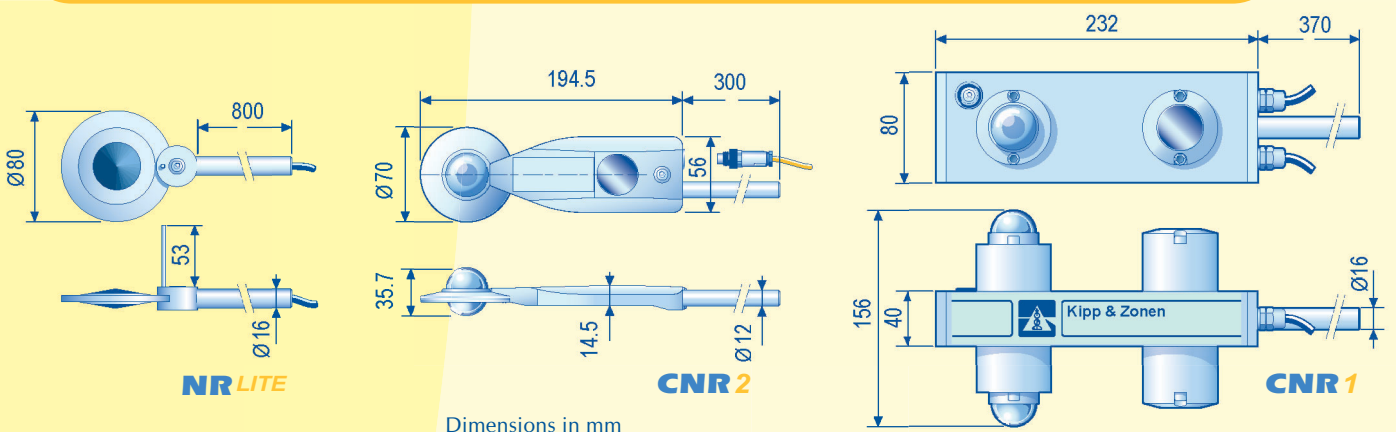
NR Lite is a low cost net radiometer with a Teflon™ coated, weather resistant black conical absorber. A vertical stick prevents birds from affecting the measurement. NR Lite is based on a single differential thermopile sensor and has one output for the total net radiation.

NR Lite is lightweight and simple and is frequently used in low cost weather and hydrology systems.

## SPECIFICATIONS

Measurement	CNR 1		CNR 2		NR LITE
	SW	LW	Net SW	Net LW	Net Total
Signal outputs	2	2	1	1	1
Temperature output	-	1	-	-	-
Response time (95%)	< 18 s	< 18 s	< 10 s	< 10 s	< 60 s
Offset type A	< 15 W/m <sup>2</sup>	-	< 15 W/m <sup>2</sup>	-	-
Offset type B	< 4 W/m <sup>2</sup>	< 4 W/m <sup>2</sup>	< 5 W/m <sup>2</sup>	-	-
Window heating offset	-	< 25 W/m <sup>2</sup>	-	< 25 W/m <sup>2</sup>	-
Field of view	180°	150°	180°	150°	180°
Directional error	< 25 W/m <sup>2</sup>	-	< 25 W/m <sup>2</sup>	-	< 30 W/m <sup>2</sup>
Temperature dependence of sensitivity (-10 °C to +40 °C)	< 4 %	< 4 %	< 5 %	< 5 %	-
Daily uncertainty	< 10 %	-	< 10 %	-	-
Expected output range under atmospheric conditions	0 to +50 mV	-5 to +5 mV	0 to +50 mV	-5 to +5 mV	-25 to +25 mV
Heater	12 VDC, 6 W		-		-
Operating temperature	-40 to +80 °C		-40 to +80 °C		-30 to +70 °C
Weight, including rod, without cable	2500 g		360 g		490 g
Cable length	10, 25, 50 m		10, 25, 50 m (with connector)		15 m

### CNR SERIES NET RADIOMETER RANGE



Kipp & Zonen B.V. reserve the right to alter specifications of the equipment described in this documentation without prior notice

## SOLAR & ATMOSPHERIC SCIENCE

[WWW.KIPPZONEN.COM](http://WWW.KIPPZONEN.COM)

**Kipp & Zonen B.V.**  
P.O. Box 507 2600 AM  
Delft, The Netherlands  
**T** +31(0)15 2755 210  
**F** +31(0)15 2620 351  
**E** [info@kippzonen.com](mailto:info@kippzonen.com)

