

RA01

2-component radiometer

RA01 is a market leading 2-component radiometer, mostly used in scientific-grade energy balance and surface flux studies. It offers 2 separate measurements of solar and longwave radiation. Product features include a modular design, low weight, and easy levelling, and low solar offsets in the longwave measurement. The unique capability to heat the pyrgeometer reduces measurement errors caused by dew deposition. When combined with estimates of solar albedo and of local surface temperature, this instrument can also be used for estimation of net radiation. The advantages of this approach are cost reduction and independence from local surface properties.



Figure 1 RA01 2-component radiometer

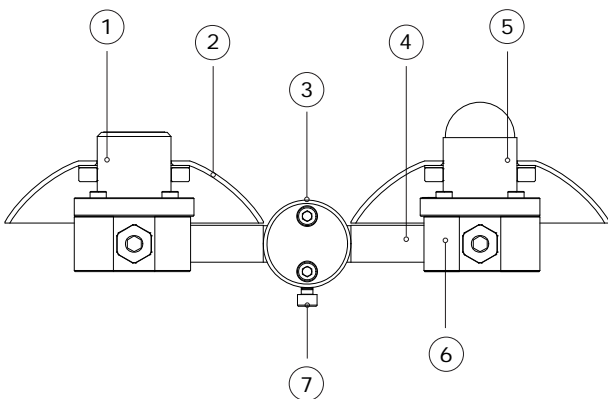


Figure 2 overview of RA01:
 (1) upward facing pyrgeometer, (2) sun screens,
 (3,4,7) levelling assembly for x- and y-axis, (5) upward facing pyranometer, (6) instrument body

Introduction

RA01 measures the 2 incoming components of the surface radiation balance: global solar and downward longwave radiation. The solar radiation sensor is called pyranometer, the longwave sensor is called pyrgeometer. For calculation of sky temperature, it is necessary to compensate for irradiated heat by the pyrgeometer (Stefan-Boltzmann law). A Pt100 temperature sensor is included in RA01's body for that purpose. Sunshine duration may be estimated according to the WMO approved pyranometric method.

Operation

Using RA01 radiometer is easy. It can be connected directly to commonly used data logging systems. The irradiance levels in W/m^2 are calculated by dividing the RA01 outputs, small voltages, by the sensitivities. The longwave irradiance should be corrected using the instrument body temperature. The sensitivities of all sensors are provided with RA01 on its product certificate.

RA01 design

RA01 radiometer has a modular design: it is possible to take the instrument apart and replace or re-calibrate individual sensors. A 2-axis levelling assembly is included. The levelling assembly fits a 1 inch NPS tube (the tube's recommended outer diameter equals 33.4×10^{-3} m). With the RA01 shim, included in RA01's delivery, a $\frac{3}{4}$ inch NPS tube may also be used.

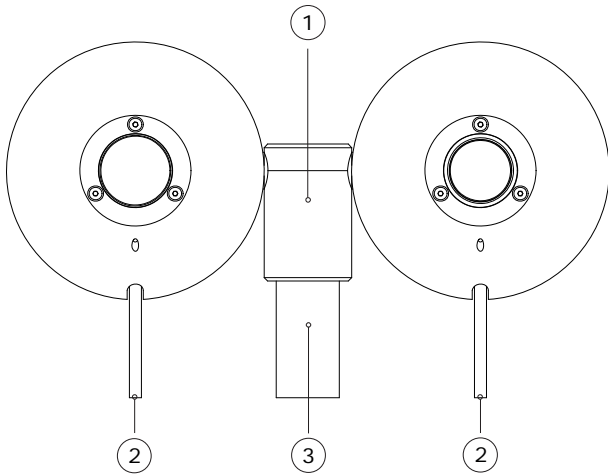


Figure 3 top view of RA01:
(1) levelling assembly for x- and y-axis, (2) cables,
(3) mounting tube (not included)

Suggested use

- energy balance studies
- surface flux measurements
- climatological networks

Standards

Applicable instrument-classification standards are ISO 9060 and WMO-No.-8; Guide to Meteorological Instruments and Methods of Observation.



Figure 4 RA01 2-component radiometer in detail:
pyranometer model SR01

RA01 specifications

Measurand	global solar radiation
Measurand	downward longwave radiation*
Optional measurand	sky temperature*
Optional measurand	sunshine duration
Included sensors	1 x ISO 9060 second class pyranometer
	1 x pyrgeometer with 150 ° field of view angle
Leveling	2-axis levelling assembly included
Mounting	on a 1 inch NPS tube; RA01 delivery includes a shim for easy alternative mounting on a $\frac{3}{4}$ inch tube (tubes not included)
Temperature sensor	Pt100
Measurand Pt100	instrument body temperature
Required readout	2 x DC voltage, 1 x Pt100
Calibration traceability solar	to WRR
Spectral range solar	$285 \text{ to } 3000 \times 10^{-9} \text{ m}$
Calibration traceability longwave	to WISG
Spectral range longwave	$4.5 \text{ to } 40 \times 10^{-6} \text{ m}$
Rated operating temperature range	-40 to +80 °C
Heater on pyrgeometer	12 VDC, 1.5 W
Standard cable length	2 x 5 m (see options)
* Required measurand	instrument body

Options

- longer cable, in multiples of 5 m, cable lengths above 20 m in multiples of 10 m
- 10 kΩ thermistor instead of Pt100 temp. sensor

See also

- **NR01** 4-component net radiometer, the most popular instrument to measure net radiation and the 4 separate components of the surface radiation balance
- stand-alone pyranometer: **LP02**
- stand-alone pyrgeometer: **IR02**
- view our complete [product range of radiometers](#)

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