

# Solar radiation calibration scale change

WWR solar irradiance scale is expected to go down

WRR (World Radiometric Reference) contains a systematic error relative to SI (International System of Units). To correct this, WRR scale will likely shift downward by 0.34%. The change is highly relevant to climatology, solar resource assessment, and solar system performance assessment.

## Introduction

Since 1980, the WRR scale has been used as the international reference for representing the physical units of solar irradiance.

PMOD: designated institute under METAS  
The WRR scale is maintained by **PMOD** (Physikalisch-Meteorologisches Observatorium Davos), which holds the formal status in international metrology as "designated institute." Therefore, PMOD is responsible for maintaining the highest standard for solar irradiance measurement with pyranometers and pyrhemometers. For more details, visit the Swiss Institute of Metrology (**METAS**) website.

## What will happen to WRR?

It has become clear that WRR contains a systematic error relative to SI. To correct this, the WRR scale will likely shift by 0.34%.

Since the WRR scale was too high, all irradiance measured with traceability to WRR must be corrected to lower values in  $[W/m^2]$ . Correspondingly, with the correction from WRR to the new scale (name yet to be determined), the sensitivities of instruments like pyranometers in  $[V/(W/m^2)]$  will increase by 0.34%.

WMO (World Meteorological Organization) does not recommend retroactively correcting past data. It does, however, advise documenting which scale was used when obtaining data from pyranometers and pyrhemometers. The decision about the introduction of the new solar irradiance scale will be made at the WMO Congress in 2027.

## Literature reference for scale change

A reference for the proposed scale change is:  
Fehlmann A., Kopp G., Schmutz W. et al. Fourth World Radiometric Reference to SI radiometric scale comparison and implications for on-orbit measurements of the total solar irradiance. Metrologica 49 (2012) p34-38

### PMOD pyranometer calibration\*

|                        |  |
|------------------------|--|
| calibrated quantity    | responsivity to solar irradiance   |
| calibrated instrument  | pyranometer  |
| measurand              | $V/(W/m^2)$  |
| uncertainty            | 0.66%  |
| calibration method     | pyranometer comparison to pyrhemometer   |
| calibration conditions | – instrument tilt $0.0^\circ$<br>– angle between normal of receiver surface and solar beam : $24^\circ$ to $50^\circ$<br>– global solar irradiance : $800 W/m^2$ to $1000 W/m^2$ |
| calibration reference: | World Radiometric Reference (WRR)  |
| type of source         | sun and clear sky  |

\* Reference: [BIPM website](#)

## What we do at Hukx to prepare

Hukx's latest industrial pyranometers allow users to add metadata, to indicate if calibration is traceable to WRR or the new scale, and on-board calibration records and calibration history. All records are conveniently stored in the instrument.

## About Hukx

Hukx is the leading innovator in solar radiation and heat flux sensor technology. We are proud to set the standard in high-accuracy measurement, and to be working at the heart of the energy transition.

Customers worldwide rely on our bestselling pyranometers and heat flux sensors. From sensor design and selection to supply and recalibration, we support you across the entire lifecycle.

Hukx is headquartered in the Netherlands, with locally owned representative sales offices in the USA, Brazil, India, China, Southeast Asia, and Japan.

Let us help you select the best sensor for your application. Get in touch with our experts today via: [info@hukx.com](mailto:info@hukx.com)

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Version 2507

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