

SR20: The making of

A secondary standard pyranometer setting new standards

Hukseflux invested more than 10 man-years in developing the infrastructure to manufacture, test and calibrate a secondary standard pyranometer. These efforts resulted in the SR20 secondary standard pyranometer, released February 2013.



Figure 1 SR20 secondary standard pyranometer



Figure 2 Directional response testing at Hukseflux

Objective

The main objective for the SR20 design team was to develop the highest accuracy pyranometer at the most attractive price level. The results are extraordinary.

Result: accuracy

To improve accuracy Hukseflux focused on:

- reduction of "zero offset a"
- reduction of initial calibration uncertainty

"Zero offset a" reduction is achieved by designing a new detector, using state of the art technology. The "zero offset a" specification of SR20 is 5 W/m² unventilated. Competing models state 12 W/m² unventilated and 7 W/m² ventilated.

The calibration uncertainty was reduced in cooperation with PMOD World Radiation Center in Davos, Switzerland. The initial calibration uncertainty is reduced to less than 1.2 %, an improvement of 15 % relative to competing models.

Result: infrastructure for efficiency

Hukseflux developed state-of-the-art facilities for calibration and for conformity assessment. The equipment and procedures were designed and successfully implemented, allowing fast and accurate work. As a result instruments are produced efficiently and can be offered at the most attractive price level.

Comparative testing

SR20 prototypes and product models were tested outdoor and indoor against competing secondary standard instruments.

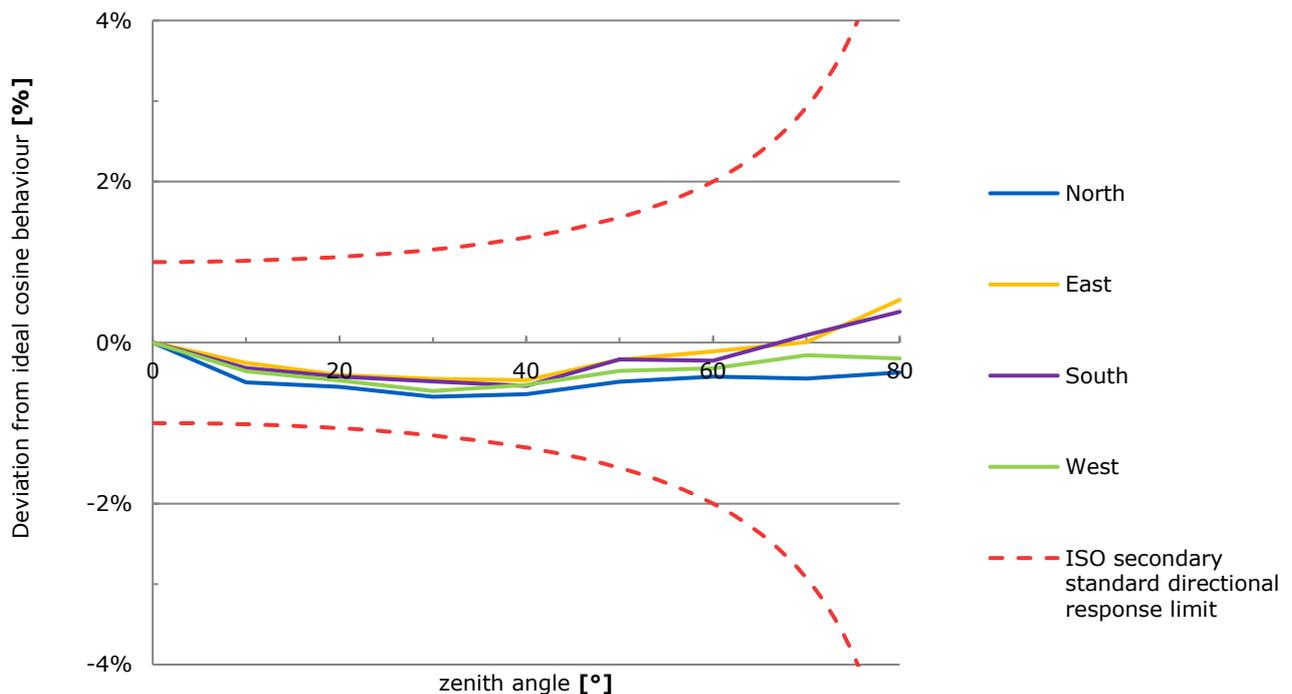


Figure 3 Directional response of a SR20 pyranometer of 4 azimuth angles, compared to secondary standard limits

Individual testing of every instrument

In order to be classified as secondary standard, every pyranometer needs to be tested individually for all critical specifications. As an example, Figure 3 shows directional response test results of a SR20 pyranometer. Each SR20 is supplied with a product certificate, reporting directional response, temperature response and response time (95 %).

Reference calibration at PMOD

Hukseflux' internal working standard, the reference for our SR20 calibration, has been calibrated at PMOD World Radiation Center in Davos, as shown in Figure 4.

Worldwide support

Hukseflux has pyranometer calibration equipment and servicing facilities in the following regions:

- Europe
- United States of America
- China
- Japan

For contact details, please visit www.huksefluxusa.com



Figure 4 PMOD certificate of SR20

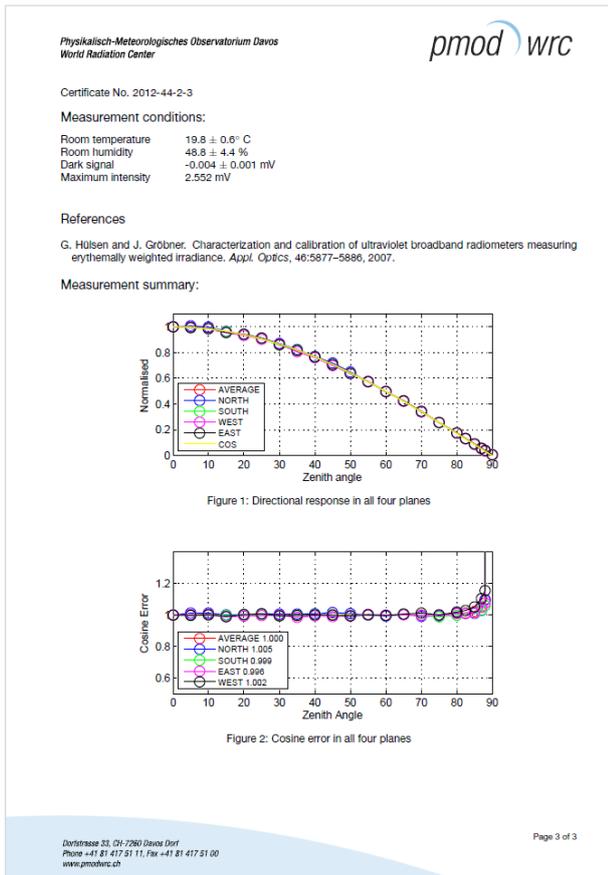


Figure 5 External testing: directional response measurements of SR20 prototypes at PMOD



Figure 6 Temperature response testing at Hukseflux

Choosing the right instrument

Pyranometers are subject to classification in three classes according to ISO 9060.

From second class to first class and from first class to secondary standard, the achievable accuracy improves by a factor 2.

Measurement accuracy does not only depend on instrument properties, but also on measurement conditions. A very accurate instrument will quickly underperform without a regular schedule of maintenance.

Our pyranometer selection guide assists you in choosing the right instrument.

Whatever your application is, Hukseflux offers the highest accuracy in every class at the most attractive price level.



Figure 7 SR20 pyranometer with its sun screen removed

See also

- SR20 brochure
- view our complete product range of solar sensors

About Hukseflux

Hukseflux Thermal Sensors, founded in 1993, aims to advance thermal measurement. We offer a complete range of sensors and systems for measuring heat flux, solar radiation and thermal conductivity. We also provide consultancy and services such as performing measurements and designing instrumentation according to customer requirements. Customers are served through the main office in Delft in the Netherlands, and locally owned representations in the USA, China and Japan.

Would you like additional information?
E-mail us at: info@huksefluxusa.com