Operators of photovoltaic systems expect their system to function reliably for maximum electricity yield.

To monitor the correct functioning of photovoltaic systems, it is advisable to continuously measure the solar irradiance using irradiance sensors.

Solar irradiance sensors which correspond in their construction to a photovoltaic module are preferably used. Consequently, solar irradiance sensors are often composed of a solar cell and measuring electronics determining the short-circuit current of this solar cell.

The irradiance sensitivity is then used to convert the short-circuit current into the corresponding irradiance. Thus, the irradiance sensitivity of the radiation sensor is one of the most important influencing factors for correct monitoring of the solar irradiance and needs to be determined during calibration of the sensor.

In the solar cell calibration laboratory of the Calibration and Test Center (CalTeC) of the Institute for Solar Energy Research (ISFH) we perform a **DAkkS accredited calibration** of solar irradiance sensors.

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Calibration of Solar Irradiance Sensors

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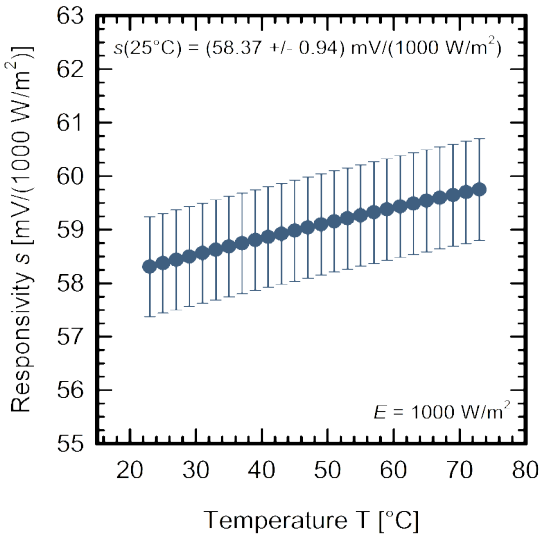
ISFH CalTeC

Calibration of Solar Irradiance Sensors

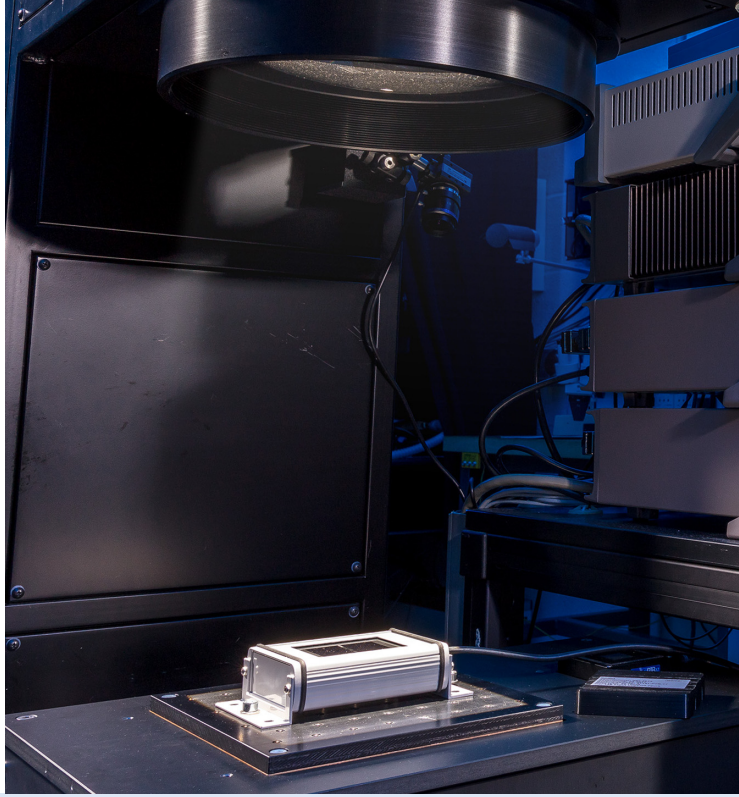
The calibration of solar irradiance sensors is carried out under standard testing conditions at a temperature of 25°C and the AM1.5G reference spectrum at an irradiance of 1000 W/m^2.

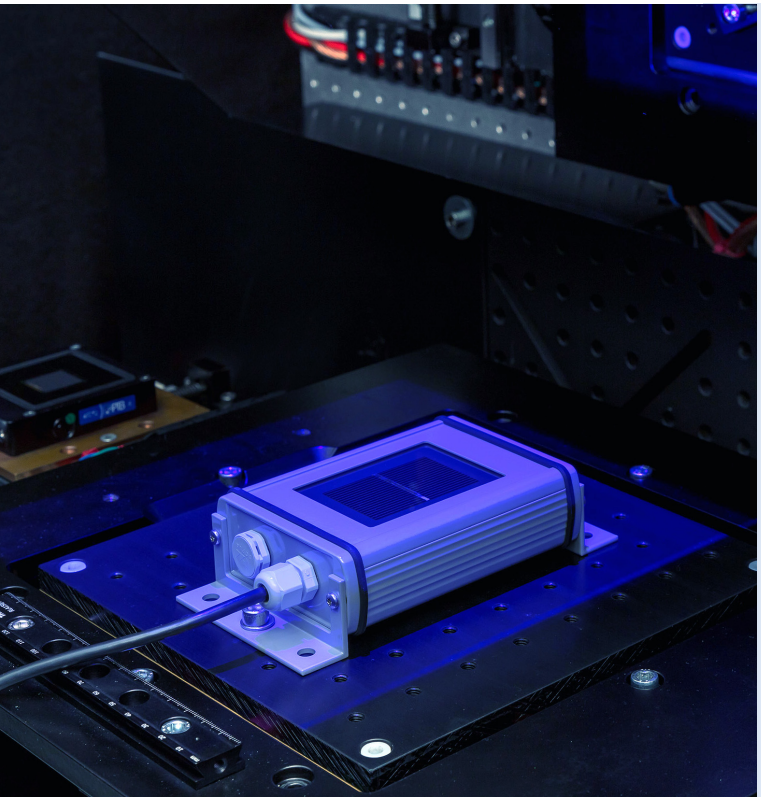
Since irradiance sensors are usually not actively cooled, they heat up under real operation conditions. Therefore our calibration always includes the determination of the responsivity as a function of temperature.

For this purpose, the sensor is illuminated with the light of an AAA sun simulator and the output signal of the irradiance sensor is measured as a function of temperature between 23 and 75°C using the built-in temperature sensor.



Calibrated measurement of the responsivity *s* of a solar irradiance sensor as a function of temperature *T*

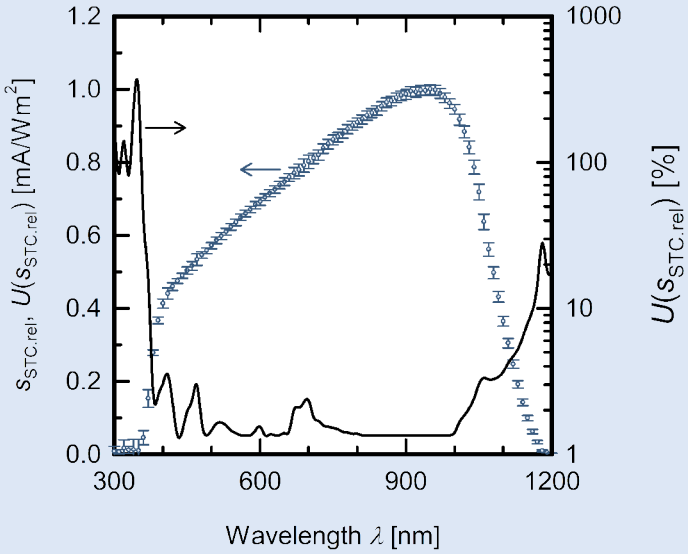




If the output signal of the sensor does not change linearly with the irradiance, a calibration at different irradiance levels need to be performed. For this purpose we offer calibrations at 100, 500 and 1000 W/m^2.

To obtain highest precision we also recomand a spectral mismatch correction. For this purpose we measure the spectral responsivity $s(\lambda)$ as a function of wavelength λ.

This measurement requires a sensor without measuring electronics or measuring resistor. Alternatively, it can be carried out on a sensor of identical construction.



Calibrated measurement of the spectral responsivity $s_{STC.rel}(\lambda)$ of a solar irradiance sensor under standard testing conditions (STC) and associated measurement uncertainty *U*