



## DNI measurements at CPV sites

Concentrating Photovoltaics (CPV) is driven by only direct solar radiation. To quantify the energy efficiency of a CPV system the total DNI and direct spectral solar irradiance, called spectral DNI, can be measured.

Solar sensors are crucial during the phase of development and operation. Even at high sunny places, the composition and variability of the atmosphere strongly affects the solar spectral distribution and will impact on the energy yield and the decision on which cell type to use. The pyrheliometer in combination with the spectral radiometer for DNI measurements accurately pinpoint the solar prospect for certain sites, the spectral impact on the performance and efficiency of the module.

With the MS-56 or MS-57 pyrheliometer in combination with one of the STR-series trackers, the total DNI can be accurately measured in real time. For CPV applications the solar spectral distribution is of even greater value. The EKO WISER system is based on two individual spectroradiometers which act as one. The spectral irradiance can be measured from 300-1700nm.

## HOW-TO Application Guide

1

Since many operators put the solar sensors on the CPV tracker system, for independent performance measurements it is advisable to put a separate sun tracker system adjacent to the CPV tracker. Considering that the STR sun tracker has a higher sun tracking accuracy than most of the CPV sun trackers, an accurate measurement can be guaranteed over time. Another reason for higher precision measurement is that the CPV trackers are put automatically in stall position (Panel in horizontal position) during windy conditions. In this case the STR-sun tracker continues to perform DNI measurements meanwhile the CPV modules cannot operate.

2

The solar spectrum will substantially vary as a function of airmass and composition of the atmosphere, the spectroradiometers reveals those features. Where the pyrhelimeter is most suitable to quantify the total DNI of the solar spectrum. The spectroradiometers give detail about the energy distribution which is important for PV or CPV cell research.

3

The MS-711 and MS-712 spectroradiometer are unique all weather concept spectroradiometers with no moving parts and temperature controlled spectrometers. The MS-712 can be used stand alone, but in combination with the MS-711 it covers the spectral range from 300nm to 1700nm. MS-711 measures in the range from 300nm and 1100nm, and MS-712 covers the near-infrared (NIR) range between 900nm and 1700nm. Both spectroradiometers are accurately calibrated with traceability to the International Standards and issued with a calibration uncertainty budget.