DHI Measurements

Diffuse Horizontal Irradiance measurements are best performed with a thermopile sensor called Pyranometer mounted on a Sun tracker with a shading device. When the pyranometer is installed on an automatic sun tracker, the diffuse radiation can be measured in two different ways: directly by the shaded pyranometer or by calculating DHI from GHI and DNI.

Measuring Diffuse irradiance requires an accurate pyranometer with low offset properties. During clear sky conditions the DHI irradiance (W/m2) is less than 20% of the total irradiance. Zero offsets lead to underestimation of the measured irradiance.

When measuring the diffuse horizontal irradiance with a shaded pyranometer, you will need a sun tracker in combination with shading ball/disc assembly. In this configuration the pyranometer is exposed to diffuse solar radiation only. The **MS-80** pyranometer has the lowest offset characteristics and is the best choice for DHI measurements.

As an alternative when measuring the diffuse horizontal irradiance without shading device, you can use a sun tracker in combination with a pyrheliometer (**MS-57**) to measure DNI and pyranometer receiving the global radiation component GHI. In this configuration the DHI can be calculated from the GHI minus the cosine weighted DNI.

HOW-TO Application Guide

1. The best method depends of its application and budget. The method with the shaded pyranometer on the sun tracker is the most accurate. To measure all three irradiance components (DNI, DHI, GHI) a pyrheliometer is also required.

2. EKO's new solar Monitoring Systems, called **STR-21G-S**, are dedicated sensor system to perform the most accurate solar radiation measurements of the three solar radiation components (Direct, Diffuse and Global). It can be easily integrated to any DAQ system, which has multiple analog or digital inputs. With the standard sun-position sensor and GPS receiver built inside the sun tracker the system set-up will be quick and easy.

3. Another cost-effective method to measure DHI is to use **MS-90 DNI sensor** in combination with a **MS-80** pyranometer. This system can calculate DHI from GHI and DNI measurements and integrated GPS data without need of a tracker. It can be installed more easily and does not require adjustments after installation.

   Measuring of the diffuse horizontal irradiance by using a **shading ring** could be an alternative option that require regular adjustments.