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RaZON$^+$, a novel solar monitoring system

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We present RaZON$^+$, the new Kipp en Zonen solar monitoring system for accurate and cost effective solar measurements. The system uses a DNI instrument and a shaded pyranometer to measure direct normal irradiance (DNI) and diffuse horizontal irradiance (DHI). From these measurements RaZON$^+$ calculates the global horizontal irradiance (GHI). Calculation of the GHI and measurement of the DHI instead of the other way around minimizes the uncertainty due to the directional response of the pyranometer. For the DNI measurement a new concept DNI instrument, with inherent low fouling sensitivity, will be presented. The RaZON$^+$ system performance has been evaluated by comparison with a CHP1 and CMP11 mounted on a 2AP tracker. Next to the solar measurements also the pointing accuracy has been established using a pointing accuracy instrument. The instruments in the system communicate through a Modbus protocol with the on-board microprocessor system. This allows for connecting Modbus enabled sensors of Kipp en Zonen and other manufacturers such as temperature sensors. The system as a whole has connectivity through a wired connection, either Ethernet or a two wire RS485 connection, and a Wi-Fi connection. Monitoring data can be accessed in real-time on an interactive and on-board webpage as well as through download of data files.