Pioneering Detector Technology and Architecture Used in a Next Generation Pyranometer Yielding Negligible Thermal Offsets and Sub-second Response

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The last 100 years of pyranometer development has seen very little change from the original optical and physical design. This lack of innovation has forced limits on measurement accuracy and stunted the proliferation of high-quality sensors crucial to understanding a changing global climate. EKO Instruments recently developed a new pyranometer (MS-80) with a novel architecture that allows for true cosine response and a thermally isolation of the detector. This thermal isolation provides negligible zero offset A and B without resorting to expensive quarts or sapphire domes. In addition to this new architecture, a novel detector technology was developed allowing for a response time of 0.5 seconds (at 95%). Since the detector is deep within the remarkably sealed sensor body rather than at the sensor surface, the effects due to changes in humidity, barometric pressure, temperature, and exposure to radiation are insignificant resulting in enhanced long-term stability allowing for greater time (≥5 years) between calibrations. Through improvements to all of the ISO 9060 specifications, the measurement uncertainty of this pyranometer has been greatly reduced compared to previous secondary standard sensors allowing for faster trend analysis. Indoor and outdoor data from Japan will be presented as well as data taken from the Surface Radiation Research Laboratory at the National Renewable Energy Laboratory in Golden, CO.

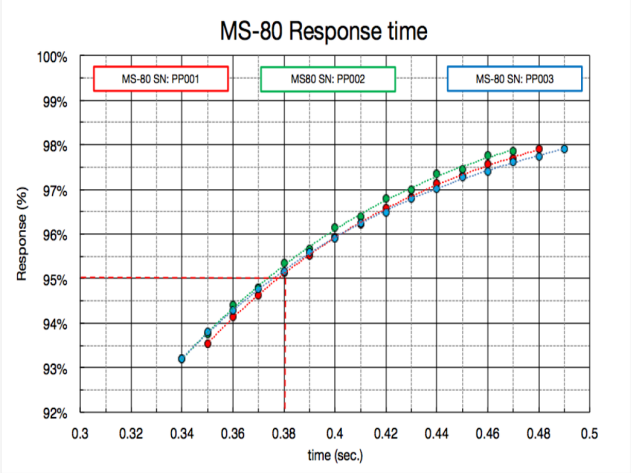

Figure 1. MS-80 Pyranometer Response Time.

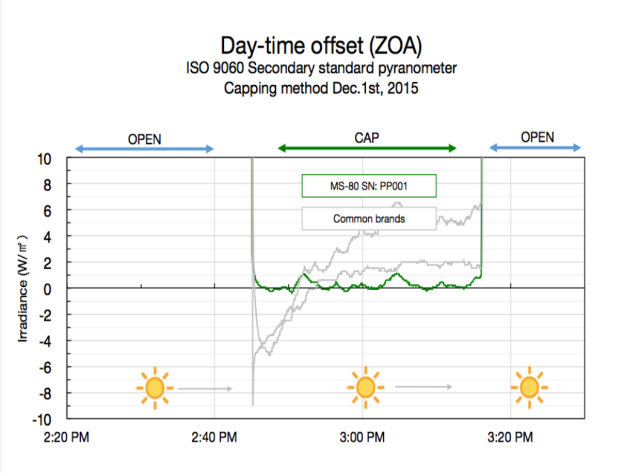

Figure 2. MS-80 Pyranometer Zero Offset A Measured Using Capping Method.