



PYRANOMETER CLASSIFICATION

ISO9060 and WMO Classification of Hemispherical Solar Instruments

The three accepted categorizations of pyranometer quality are defined differently by International Standard **ISO 9060:1990(E)** and the **World Meteorological Organisation** Guide 6th Edition. This table is derived from all comparable data from both sources.

ISO Specification	<i>ISO</i>	secondary standard	first class	second class
WMO Characteristics	<i>WMO</i>	high quality	good quality	moderate quality
Response time (to 95% of final value)	<i>ISO&WMO</i>	< 15 sec	< 30 sec	< 60 sec
Zero off-set response: to 200 W/m ² net radiant loss to sky (ventilated)	<i>ISO&WMO</i>	7 W/m ²	15 W/m ²	30 W/m ²
to 5°C/hr change in ambient temperature	<i>ISO&WMO</i>	±2 W/m ²	±4 W/m ²	±8 W/m ²
Resolution (smallest detectable change)	<i>WMO</i>	±1 W/m ²	±5 W/m ²	±10 W/m ²
Non-stability (change in sensitivity per year)	<i>ISO&WMO</i>	± 0.8%	± 1.5%	± 3%
Non-linearity (deviation from sensitivity at 500 W/m ² over 100 to 1000 W/m ² range)	<i>ISO&WMO</i>	± 0.5%	± 1%	± 3%
Directional response for beam radiation (error due to assuming that the normal incidence response at 1000 Wm ⁻² is valid for all directions)	<i>ISO&WMO</i>	±10 W/m ²	±20 W/m ²	±30 W/m ²
Spectral selectivity (deviation of the product of spectral absorptance and transmittance from the mean)				
	<i>ISO (0.35 - 1.5 μm)</i>	± 3%	± 5%	± 10%
	<i>WMO (0.3 - 3 μm)</i>	± 2%	± 5%	± 10%
Temperature response (error due to 50°C ambient temperature change)	<i>ISO&WMO</i>	± 2%	± 4%	± 8%
Tilt response (deviation from horizontal responsivity due to tilt from horiz. to vert. at 1000 W/m ²)	<i>ISO&WMO</i>	± 0.5%	± 2%	± 5%
Achievable uncertainty, 95% confidence level				
	<i>WMO hourly totals</i>	3%	8%	20%
	<i>WMO daily totals</i>	2%	5%	10%
Suitable Applications		working standard	network operations	low cost networks