



## PYRANOMETER CLASSIFICATION

### ISO9060 and WMO Classification of Hemispherical Solar Instruments

The three accepted categorizations of pyranometer accuracy are defined differently by the International Standard **ISO 9060:2018** and the **World Meteorological Organisation** Guide 8<sup>th</sup> Edition. This table is derived from comparable data from both sources.

ISO Specification WMO Characteristics	ISO WMO	Class A	Class B	Class C
		high quality	good quality	moderate quality
Response time (to 95% of final value)	ISO WMO	< 10 sec < 15 sec	< 20 sec < 30 sec	< 30 sec < 60 sec
Zero off-set response: to 200 W/m <sup>2</sup> net radiant loss to sky	ISO&WMO	7 W/m <sup>2</sup>	15 W/m <sup>2</sup>	30 W/m <sup>2</sup>
to 5°C/hr change in ambient temperature	ISO&WMO	±2 W/m <sup>2</sup>	±4 W/m <sup>2</sup>	±8 W/m <sup>2</sup>
total, including radiant & ambient	ISO	±10 W/m <sup>2</sup>	±21 W/m <sup>2</sup>	±41 W/m <sup>2</sup>
Resolution (smallest detectable change)	WMO	1 W/m <sup>2</sup>	5 W/m <sup>2</sup>	10 W/m <sup>2</sup>
Non-stability (change in sensitivity per year)	ISO&WMO	± 0.8%	± 1.5%	± 3%
Non-linearity (deviation from sensitivity at 500 W/m <sup>2</sup> over 100 to 1000 W/m <sup>2</sup> range)	ISO&WMO	± 0.5%	± 1%	± 3%
Directional response for beam radiation (error due to assuming that the normal incidence response at 1000 Wm <sup>-2</sup> is valid for all directions)	ISO&WMO	±10 W/m <sup>2</sup>	±20 W/m <sup>2</sup>	±30 W/m <sup>2</sup>
Spectral error	ISO	± 0.5%	± 1%	± 5%
Spectral selectivity (deviation of the product of spectral absorptance and transmittance from the mean)				
	ISO (0.35 - 1.5 μm)	± 3%	± 3%	± 3%
	WMO (0.3 - 3 μm)	± 2%	± 5%	± 10%
Temperature response -10°C to +40°C, relative to +20°C	ISO	± 1%	± 2%	± 4%
50°C interval	WMO	2%	4%	8%
Tilt response (deviation from horizontal responsivity due to tilt from horiz. to vert. at 1000 W/m <sup>2</sup> )	ISO&WMO	± 0.5%	± 2%	± 5%
Achievable uncertainty, 95% confidence level				
	WMO hourly totals	3%	8%	20%
	WMO daily totals	2%	5%	10%
<b>Suitable Applications</b>		working standard	network operations	low cost networks