

## ER08-S & ER08-SE PYRANOMETER

**ISO Fast Response Spectrally Flat Pyranometer of Class B/A for solar GHI**



The Middleton Solar ER08-S is for measuring solar Global Horizontal Irradiance (GHI). It exceeds the ISO specifications for a **Fast Response Spectrally Flat Pyranometer of Class B or Class A**, and uses a proprietary Integrating Cavity Thermopile to achieve very low zero off-sets, even when internally heated. The ER08-S has a passive microvolt output. The ER08-SE version has an in-built signal amplifier to give a millivolt output for easy signal measurement.

Performance Specification	ISO 9060:2018 <sup>1</sup> Spectrally Flat Class A	ER08-S & ER08-SE
Response time (to 95%) <sup>2</sup>	< 0.5 sec	0.3 sec
Zero off-set a) -200 W.m <sup>-2</sup> thermal rad.	± 7 W.m <sup>-2</sup>	< ± 0.2 W.m <sup>-2</sup> (unventilated)
Zero off-set b) 5 K.h <sup>-1</sup> ambient temp.	± 2 W.m <sup>-2</sup>	< ± 0.2 W.m <sup>-2</sup> (heater off) < ± 1.0 W.m <sup>-2</sup> (heater on)
Zero off-set c) total response	± 10 W.m <sup>-2</sup>	< ± 5 W.m <sup>-2</sup>
Non-stability (1 year interval)	± 0.8 %	< 0.1 %
Non-linearity (100-1000 W.m <sup>-2</sup> )	± 0.5 %	< ± 0.2 %
Directional response (w.r.t. 1000 W.m <sup>-2</sup> ) <sup>3</sup>	± 10 W.m <sup>-2</sup>	< ± 10 W.m <sup>-2</sup>
Spectral error (280 to 4,000 nm)	± 0.5 W.m <sup>-2</sup>	< ± 0.4 W.m <sup>-2</sup>
Spectral selectivity (350 to 1,500 nm) <sup>4</sup>	< 3 %	< 3 %
Temperature response (-10 to +40 °C)	± 1 %	< ± 1 %
Tilt response (0-90°)	± 0.5 %	< ± 0.2 %
Additional signal processing errors	± 2 W.m <sup>-2</sup>	ER08-SE < ± 2 W.m <sup>-2</sup>

**ALMOST NO ZERO OFF-SET**

**VERY FAST RESPONSE**

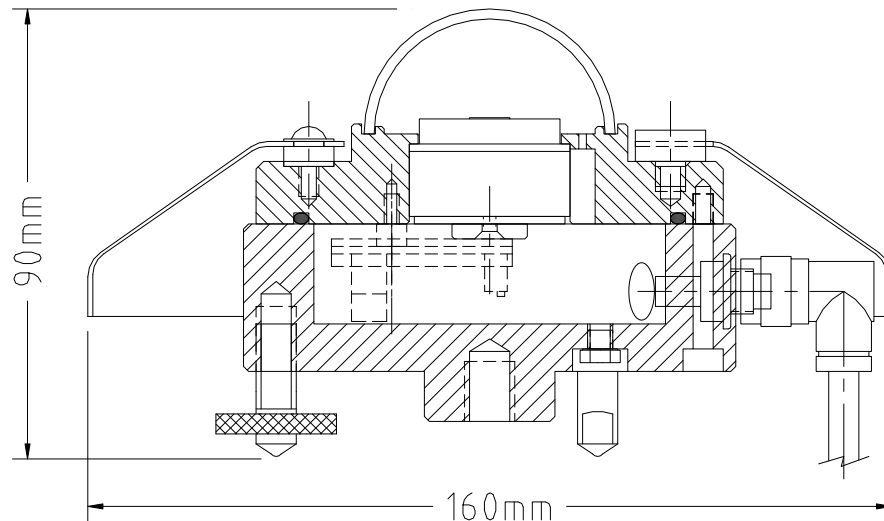
<sup>1</sup> ISO 9060:2018 Specification and classification of instruments for measuring hemispherical solar and direct solar radiation

<sup>2</sup> This requirement designates a Pyranometer as 'fast response' in ISO 9060:2018

<sup>3</sup> ISO 9060:2018 requires that a 'Class A' pyranometer be individually tested for Directional & Temperature Response

<sup>4</sup> This requirement designates a Pyranometer as 'spectrally flat' in ISO 9060:2018

## Middleton Solar ER08-S & ER08-SE Pyranometer Detailed Specification



### General Specification

viewing angle	$2\pi$ steradians
irradiance	0 - 4,000 W.m <sup>-2</sup>
spectral range	300 – 3,000nm (nominal); 305 - 2,700nm (50% points)
Sensitivity (typical)	ER08-S: 7 $\mu$ V/W.m <sup>-2</sup> ; ER08-SE: 1.0 mV/W.m <sup>-2</sup>
calibration	outdoors to ISO 9847, traceable to WRR
achievable uncertainty (minute totals)	U <sub>95</sub> = 3% (RSS of instrument, calibration, measurement)
operating temperature	-40 to +80°C
operating humidity	0-100% RH
output impedance (not ER08-SC)	ER08-S: 6K $\Omega$ ; ER08-SE: 65 $\Omega$
measurement input impedance	ER08-S: >10 M $\Omega$ ; ER08-SE: >1 M $\Omega$
power requirement (not ER08-S)	7 to 15VDC, 6mA (ER08-SE)
available internal heater	12VDC, 3W
bubble level resolution	0.1°
level adjustment	one fixed foot, two adjustable feet
detector type	encapsulated thermopile
dome window	ground from solid optical glass blank; Schott N-BK10
construction	anodized marine-grade aluminium & stainless steel
desiccant	orange silica gel (non-toxic)
IP rating	sealed to IP67
mounting method	central M10 hole in base (mounting knob supplied), or two M4 holes on 65mm P.C.D.
output lead	6m, with connector at instrument end
User's Guide & Calibration Certificate	included
net weight	0.8Kg
shipping size & weight	230 x 230 x 180mm, 2Kg
warranty	2 years (standard) / 5 years (conditional)

The ER08-S/SE is supplied standard as a Class B Pyranometer. The ER08-S type is available as a Class A Pyranometer when individually tested for Directional & Temperature Response.

### Available Options

- internal 3W heater to keep dome window clear of moisture
- temperature output (ER08-S only), YSI 44031 thermistor (10K $\Omega$  @ 25°C)
- additional output lead length, up to 20m