

DN5-BF and DN5-AF PYRHELIOMETER

ISO Fast Response Spectrally Flat Pyrheliometer of Class B/A for Solar DNI



The Middleton Solar DN5-BF is a precision pyrheliometer for measuring the solar Direct Normal Irradiance (DNI) when aimed at the sun. It exceeds the International Organization for Standardization (ISO) specifications for a Fast Response Spectrally Flat Pyrheliometer of Class B. The DN5-BF has a compact thermopile sensor embedded in an integrating cavity, with the sensor not directly exposed to the sun to achieve very low zero off-set.

Performance Specification	ISO 9060:2018 ¹ Fast Response Spectrally Flat		DN5-BF & DN5-AF
	Class B ²	Class A	
Response time (to 95%) ³	< 0.5 s	< 0.5 s	0.3 s
Zero off-set a), response to 5°C/hour	± 3 W.m ⁻²	± 1 W.m ⁻²	< ± 0.2 W.m ⁻²
Zero off-set b), total response	± 4 W.m ⁻²	± 2 W.m ⁻²	< ± 1.0 W.m ⁻²
Non-stability (1 year interval)	± 1%	± 0.5%	< 0.2%
Non-linearity (100 - 1000 W.m ⁻²)	± 0.5%	± 0.2%	< ± 0.2%
Spectral error (280 to 4,000nm)	± 1%	± 0.2%	± 0.2%
Spectral selectivity (350 to 1,500nm) ⁴	< 3%	< 3%	< 2.5%
Temperature response (-10 to +40°C)	± 1%	± 0.5%	< ± 1% (DN5-BF) < ± 0.5% (DN5-AF)
Tilt response (@ 1000 W.m ⁻²)	± 0.5%	± 0.2%	< ± 0.2%
Additional signal processing errors	± 5 W.m ⁻²	± 5 W.m ⁻²	not applicable

The DN5-AF version has a temperature output and is a Class A Pyrheliometer⁵.

EXCELLENT PERFORMANCE, USER FRIENDLY, DURABLE

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

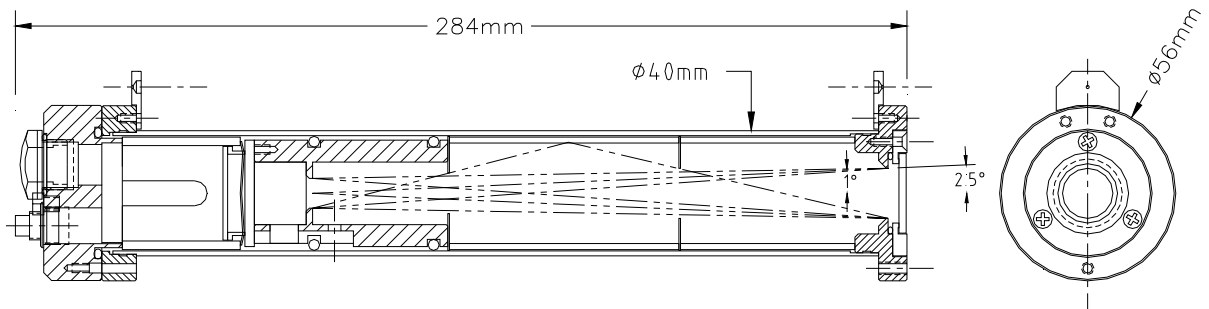
² ISO 9060:2018 'Class B' supersedes ISO 9060:1990 'First Class', and 'Class A' supersedes 'Secondary Standard'

³ This ISO 9060:2018 requirement designates a Pyrheliometer as 'fast response'

⁴ This ISO 9060:2018 requirement designates a Pyrheliometer as 'spectrally flat'

⁵ ISO 9060:2018 requires that a 'Class A' pyrheliometer be individually tested for Temperature Response

Middleton Solar DN5-BF & DN5-AF Pyrheliometer Detailed Specification



Can be operated with all Middleton Solar Trackers: APT-02, AST-02, AST-03.
Aiming diopter conveniently located on top of instrument.
Temperature compensated sensor assembly is thermally isolated from the instrument body.
Optical geometry, and baffling, is set by four precisely located apertures.
Supplied with User Manual and Calibration Certificate.

General Specification

full opening angle	5.0°
slope angle	1.0°
limit angle	4.0°
irradiance	0 – 4,000 W.m ⁻²
spectral range (nominal)	200 – 5,000nm
sensitivity (typical)	8 ± 0.5 μV/W.m ⁻²
calibration method	outdoors to ISO 9059, traceable to WRR
calibration period	2 years (recommended)
achievable uncertainty (minute totals)	U ₉₅ = 1.5% (RSS of instrument, calibration, measurement)
operating temperature	-40 to +80°C
temperature output, DN5-AF	YSI 44031 thermistor (10KΩ @ 25°C)
operating humidity	0-100% RH
output impedance	7 KΩ
measurement input impedance	>10 MΩ
window material	optical sapphire, 2mm thick
construction	anodised marine-grade aluminium & stainless steel
desiccant	silica gel (orange, non-toxic), externally accessible
IP rating	sealed to IP67
output lead	6m, with connector at instrument end
net weight	0.75kg (excluding lead)
shipping size & weight	310 x 225 x 110mm, 1kg
warranty	2 years (standard) / 5 years (conditional)

Available Options

- Temperature output for DN5-BF
- PM02 Pyrheliometer Mount (for Ø25mm Tracker axle)
- Additional output lead length, up to 20m