

HelioScale

Measurement Solutions for Solar Radiation

HelioScale

α φ ω
[alpha] [phi] [omega]

Adjust our stations to your needs –
Optional items for HelioScale stations



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Solar Measurement Solutions

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OPTIONAL ITEMS TECHNICAL SPECIFICATIONS

Additional Thermopile Pyranometer GHI – Global Horizontal Irradiance in W/m²

An additional thermopile pyranometer is recommended to measure broadband GHI and Global Tilted Irradiance or to get redundant measurements.



Classification	Secondary Standard (ISO9060)/ WMO High Quality	For alpha, phi and omega stations
Calibration uncertainty	<1.2%	α φ ω
Zero offset	5 W/m ² unventilated, 2.5 W/m ² ventilated	
Spectral range	300 to 3000 nm	
Operating temperature range	–40 to +80 °C	
Temperature response	<± 0.4% (–30 to +50 °C)	
Output	RS-485, Modbus-RTU	

Shadow Ball Assembly Kit with Tracker and Thermopile Pyranometer DIF – Diffuse Horizontal Irradiance in W/m²

A shadow ball assembly kit is a dedicated measurement system to perform the best possible solar radiation measurements of the DIF component. Combined with an additional thermopile pyranometer to measure GHI, the DNI (Direct Normal Irradiance) component can be calculated. Data from this configuration also facilitates redundancy tests and quality checks.



Sun Tracker upgrade (STR22G)	Dual arm with sun sensor	For omega stations
Motor	Stepping motor	ω
Driving technology	Harmonic drive	
Pointing accuracy	<0.01° (solar elevation: 0 to 87°)	
Angle resolution	0.009°	
Rotation angle	Elevation angle (–15° to +95°)	
Tracker-payload	15 kg balanced	
Temperature range	–40 to +50° (–30 to +50° at cold start)	
2 Secondary Standard Pyranometer	See above	

Soiling Sensor Solar radiation and measurement of soiling

Soiling is the accumulation of dust on solar modules, which causes a decrease in PV output. The HelioScale soiling measurement system allows you to quantify the site-specific effects of soiling on PV power generation.



Calibration value	100 mV / 1000 W/m ² , +25 °C	For alpha, phi and omega stations
3 ISET solar cell sensors	Monocrystalline	α φ ω
Integrated temperature sensor	Pt1000	
Working temperature range	–25 to +80 °C	
Measurement uncertainty	<±4% at 95% confidence level	
Maintenance	Depending on the environmental conditions dirt retentions have to be removed at regular intervals	

Sunshine Duration Sensor Sunshine state and duration

For the precise measurement of sunshine duration as defined by the WMO, we provide a low maintenance and low power sensor suitable for remote stations.



Measuring element	Photodiode	For alpha, phi and omega stations
Spectral response	400 to 1100 nm	α φ ω
Threshold value	120 W/m ²	
Viewing angle	270°	
Response time	1 s	
Accuracy	10% at 95% confidence level	
Longterm drift	<±2% per year	
Operating temperature	–40 to +70 °C	
Threshold stability	±0.5% per year	

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OPTIONAL ITEMS TECHNICAL SPECIFICATIONS

Wind Speed (at 3 m height) Cup anemometer

Horizontal wind speed can affect system performance. HelioScale stations can be equipped with anemometers to measure the horizontal wind speed (velocity). They are robust and resistant to turbulence and skew winds caused by masts and traverses.



Sensing element	Cup rotor	For alpha, phi and omega stations
Transducer	Hall effect sensor with frequency output	
Output signal	0 to 50 m/s = 0 to 200 Hz	α φ ω
Pulse level	LO = <0.5 V HI = Vsupply	
Resolution	0.25 m wind run	
Accuracy	0 to 10 m/s ±0.3 m/s	
Starting threshold	0.5 m/s	
Heating	No heating	
Operating temperature	-30 to +65 °C	
Included mast	3 m height	

Wind Speed & Direction (at 10 m height) Cup anemometer & wind vane

Measuring wind speed and direction at 10 m height is recommended by the WMO for better accuracy. Wind direction is valuable for sophisticated plant layouts and operation.



Sensing element	Vane & Cup rotor (for the cup rotor specs see above)	For alpha, phi and omega stations
Output	0 to 350° = 0 to 5 kΩ	
Resolution	1°	α φ ω
Accuracy	±3.6° = 1% FS	
Heating	No heating	
Operating temperature	-25 to +70 °C	
Maximum wind speed	35 m/s	
Included mast	10 m height	

Tipping Bucket Rain Gauge Precipitation

The tipping bucket mechanism is a robust and effective rainfall measurement system. The bucket geometry and material are specially selected for maximum water release, thereby reducing contamination and errors.



Dimension	Ø 0.18 m x 0.3 m height	For alpha, phi and omega stations
Catchment area	0.02 m ²	
Resolution	0.1 mm precipitation per count	α φ ω
Accuracy	2% up to 25 mm/h 3% up to 50 mm/h	
Output signal	Impulse	
Transducer	Magnetic reed switch	
Operating temperature	-20 °C to +50 °C	

Snow Height Sensor Snow height

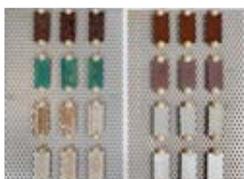
Monitoring snow height for a system installed in climates with significant snowfall can increase yields by smart plant operation. Therefore we provide a rugged, acoustic sensor that provides a non-contact method for determining snow height.



Measurement element	Ultrasonic sensor	For alpha, phi and omega stations
Measurement range	up to 5 m	
Resolution	0.01 m	α φ ω
Accuracy	±0.02 m	
Operating temperature range	-40 to +70 °C	

Atmospheric Corrosion Assessment Atmospheric corrosivity by exposition of corrosion samples

Corrosion can be a problem under certain environmental conditions. Measuring the effects of atmospheric conditions on specific metals with our measurement set-up provided by Fraunhofer-Institute for Solar Energy Systems helps to classify corrosion potential and choosing adequate materials.



Measurement elements	12 metal samples of aluminum (Al), copper (Cu), steel (Fe) and zinc (Zn)	For alpha, phi and omega stations
Dimension	0.6 m x 0.4 m	
Exposing standard	1 year according to ISO 9226:2012	α φ ω
Maintenance	The measurement set-up is maintenance-free	
Output	Rate of corrosion of the metal samples in accordance to ISO 8407/2009	



Wilmers Messtechnik GmbH
Hammer Steindamm 35
22089 Hamburg, Germany
phone: +49(0)40-75 66 08 98
e-mail: info@wilmers.com
www.wilmers.com



Suntrace GmbH
Brandstwiete 46
20457 Hamburg, Germany
phone: +49(0)40-7679 63 80
e-mail: meteo@suntrace.de
www.suntrace.de

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