Kipp & Zonen Sun Tracker Selection Guide

RaZON+

all-in-one

RaZON+ is an **ALL-IN-ONE Solar Monitoring System** that provides global (GHI), direct (DNI) and diffuse (DHI) irradiance and can be expanded to a full weather station with third party sensors. GPS and data logging are integrated. Customer friendly Wi-Fi interface and anti-soiling design to reduce maintenance.

Best price / performance ratio	✓
Easily transportable, low weight	✓
Integrated data logger	✓
Low power	✓
Optional Wi-Fi	✓
Integrated measurement / calculation of GHI, GDI and DNI *	✓
Anti-soiling radiometer design	✓
Allows fitting of non Kipp & Zonen radiometers	
Other instruments and loads can be fitted	
Temperature < -20°C	
Sun sensor for active tracking	
Daily uncertainty GHI	2%
Daily uncertainty DNI	2%
Baseline Surface Radiation Network (BSRN) compatible	

Typical applications

Small meteorological stations, used in temperate climates.
For solar energy resource mapping. CSP, CPV and tracking PV site prospecting. Continuous power plant monitoring.

* Also available without radiometers: RaZON+ Smart Solar Monitoring Base

RaZON+ is fitted as standard with the PR1 pyranometer and PH1 pyrheliometer. A base version is also available for mounting SMP/SHP radiometers. Even though the standard RaZON+ instrument specifications are second class, the calculated GHI is as accurate as our SMP21 secondary standard pyranometer. The uncertainty of the PH1 is proven to be within 1% of our CHP1 and SHP1 pyrheliometers.

SOLYS2

versatile

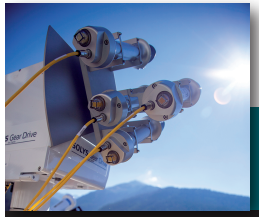
SOLYS2 is a versatile sun tracking solution. A wide range of radiometers can be mounted. The integrated GPS automatically configures location and time. Solar position and status monitoring information are available via the communication ports.

Best price / performance ratio	✓
Easily transportable, low weight	
Integrated data logger	
Low power	
Optional Wi-Fi	
Integrated measurement / calculation of GHI, GDI and DNI	
Anti-soiling radiometer design	
Allows fitting of non Kipp & Zonen radiometers	✓
Other instruments and loads can be fitted	✓ /20 kg
Temperature < -20°C (AC power only)	✓
Sun sensor for active tracking	✓ optional
Daily uncertainty GHI	1 to 2%
Daily uncertainty DNI	1%
Baseline Surface Radiation Network (BSRN) compatible	✓

Typical applications

For use in harsher climates and to carry multiple instruments.
Meteorology, climatology and BSRN stations.
Solar energy site prospecting and plant monitoring.

SOLYS2 has both an isolated 4-wire RS-485 port and an Ethernet port for communication with the free SOLYSMonitor Windows™ software, or with data acquisition systems. RS-485 is particularly suited to a permanent remote access connection to regularly obtain the calculated sun position (zenith and azimuth angles) and the GPS time.



SOLYS Gear Drive

high-end

SOLYS Gear Drive is a high-end sun tracker for all weather conditions and locations. It builds on the features of the SOLYS2 and has enhanced capabilities that make it suitable for use with heavy loads and in the harshest climates, such as polar conditions.

Best price / performance ratio	✓
Easily transportable, low weight	
Integrated data logger	
Low power	
Optional Wi-Fi	
Integrated measurement / calculation of GHI, GDI and DNI	
Anti-soiling radiometer design	
Allows fitting of non Kipp & Zonen radiometers	✓
Other instruments and loads can be fitted	✓ /80 kg
Temperature < -20°C (AC power only)	✓
Sun sensor for active tracking	✓
Daily uncertainty GHI	1 to 2%
Daily uncertainty DNI	1%
Baseline Surface Radiation Network (BSRN) compatible	✓

Typical applications

Designed for use in extreme climates; very hot, very cold and high wind speeds.
Can carry a large number of instruments and heavy loads.
Ideal for many scientific research purposes.

SOLYS Gear Drive has the power to point accurately at the sun in very high winds, and to break the ice that can build up overnight when the tracker is 'sleeping'. Due to the very high torque and large range of available mounting plates and adapters, multiple loads can be mounted and used in extreme climates.

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Sun Tracker Specification Comparison

Model	RaZON+ ALL-IN-ONE System	RaZON+ Smart Solar Monitoring Base	SOLYS2	SOLYS Gear Drive
	PR1 pyranometer PH1 pyrheliometer included Single zenith arm and shading disk	SMP enabling kit included Single zenith arm shading disk	Tripod included Double zenith arm	Sun sensor included Double zenith arm
Warranty	2 years, 5 years on radiometers	2 years	2 years	2 years
Operating Temperature	-20°C to +50°C	-20°C to +50°C	-20 °C to +50 °C (DC power) -40 °C to +50 °C (AC power) to max. +55 °C with sun shield	-20 °C to +55 °C (DC power) -50 °C to +55 °C (AC power) -50 °C up to 20 m/s wind speed with cold cover; to max. +60 °C with sun shield
Pointing / Tracking Accuracy	< 0.2° (passive)	< 0.2° (passive)	< 0.1 ° (passive) < 0.02 ° (active)	< 0.1 ° (passive) < 0.02 ° (active)
Pointing Wind Force	Beaufort Scale Gale Force 8	Beaufort Scale Gale Force 8	Beaufort Scale Hurricane Force 12	Saffir-Simpson Scale Hurricane Category 3
Active Tracking Sun Sensor	-	-	Optional	Standard
Torque	Sufficient for one PR1 & one PH1	Sufficient for one SMP & one SHP	> 20 Nm all conditions (30 nm max. as special)	> 60 Nm all conditions
Payload (balanced)	1 kg	1 kg	20 kg	80 kg
Angular Velocity	Up to 30 °/s	Up to 30 °/s	Up to 5 °/s	Up to 5 °/s
Angular Acceleration	-	-	Up to 3.6 °/s²	Up to 3.6 °/s²
Transmission System	High precision reduction gear	High precision reduction gear	Inverted tooth belts	High precision reduction gear
Location, Time, Date	Integrated GPS	Integrated GPS	Integrated GPS	Integrated GPS
Communication	Ethernet, optional Wi-Fi + web browser, RS-485 Modbus®, ASCII	Ethernet, optional Wi-Fi + web browser, RS-485 Modbus®, ASCII	Ethernet + web browser / RS-485	Ethernet + web browser / RS-485
Power	24 VDC (20 to 30VDC) 13 W, day and night	24 VDC (20 to 30VDC) 13 W, day and night	24 VDC (18 to 30 VDC) and 90 to 264 VAC 21 W day, 13 W night + 100 W for heater (AC)	24 VDC (18 to 30 VDC) and 90 to 264 VAC 25 W day, 13 W night + 150 W for heater (AC)
Tripod Stand	Tripod or pole mount available	Tripod or pole mount available	Included	2 types available
Height Extension Tube	Available with pole mount	Available with pole mount	Available with heavy-duty tripod	Available with heavy-duty tripod
Weight	10 kg (sun tracker + tripod + PR1 + PH1)	9 kg (sun tracker + tripod)	28 kg (sun tracker + tripod)	26 kg (sun tracker)
Pyrheliometer Mounting	Included	Included	Included	Included
Shading Ball Assembly	Included, 1 disc	Included, 1 disc	Optional, with 2 balls (3 balls possible)	Optional, with 2 balls (3 balls possible)
Maintenance	None	None	None	None
Advantages	Smart anti-soiling design radiometers included, PH1 pyrheliometer and shaded PR1 pyranometer. Integrated 1 minute data logging, data output via Ethernet or RS-485 Modbus® or ASCII. Easy set-up via Wi-Fi is suitable for all smart mobile devices. Low power, low weight, Most cost-effective solution for DNI, GHI and GDI; also accurately calculates sunshine duration. Local data and system parameter check via Wi-Fi. Future expansion capability for plug-in weather station, SMP pyranometer for POA irradiance, PV panel temperature sensor, and more.	All the advantages of the RaZON+, but without the PH1 pyrheliometer and PR1 pyranometer. A SHP1 Pyrheliometer can be fitted to improve the DNI and sunshine duration measurements. When used in combination with a shaded SMP10 pyranometer for DHI, the uncertainty of the calculated GHI is improved. The DHI and GHI uncertainties can be further improved by using the top level SMP22 pyranometer. The correct length connecting cables for the radiometers are included with the base.	More than 1150 of these sun trackers are used around the world, in solar energy and meteorology applications. The first sun tracker with integrated GPS, no software required for installation and setup or clock corrections. Ethernet and RS-485 interfaces and Windows™ software enable all parameters to be monitored. Both AC and DC power inputs, and a wide range of mountings and accessories, make this sun tracker the basis for solar monitoring applications in most environments. A tripod stand suitable for the tracker load capability is included.	All the advantages of the SOLYS2, but more. More load capability, more torque, able to point accurately in higher wind speeds and designed for operation in more extreme climates. A sun sensor for active solar tracking is included, but not a tripod stand. Many customers construct their own rigid and stable mountings, or the accessory heavy duty tripod stand can be used. The high torque and payload make the SOLYS Gear Drive ideal for scientific purposes where multiple, or large, or heavy, instruments need to be pointed accurately at the sun under all conditions.