



## STR-21G-S2 Solar Monitoring Systems

### Technical Specifications

Turnkey Solar Monitoring Station

DNI/GHI/DHI measurements

ISO 9060 secondary standard sensors

Low power consumption

ISO17025 calibration

EKO's new solar Monitoring System, the STR-21G-S2, is a dedicated sensor system to perform the most accurate solar radiation measurements of the three solar radiation components (Direct, Diffuse and Global). It can be easily integrated to any DAQ system, which has multiple analog or digital inputs. With the standard sun-position sensor and GPS receiver built inside the sun tracker the system, set-up will be quick and easy.

The system is based on the STR-21G Sun tracker with a new shading disk assembly which can be mounted on one arm of the tracker. In combination with the new generation MS-80 Secondary standard pyranometer and MS-57 First class pyrhelioscope, the STR-21G-S2 is the most "high end" sensor system for solar energy research.

The STR-21G-S2 system can be freely configured to measure the required Solar radiation components in the most accurate way. Hence, a cost-effective

solution can be created for every application. In harsh climate environments, the MV-01 ventilator & heater can be deployed. The MS-57 pyrhelioscope has a heated front window to avoid condensation and ice which can affect the measurements.

Global radiation can be composed by the sum of the cosine weighted direct and diffuse. This way the sun tracker with pyrhelioscope and shaded pyranometer can provide all three Solar radiation components. The addition of the MS-80 for GHI measurements, data can be verified by comparing the measured values to the calculated GHI. Unique to the system, EKO's radiometers have the ability to sample much faster than traditional solar sensors. Faster sample rates allow the sensor to 'catch' more accurately the peak irradiance value under variable atmospheric conditions and lower the measurement uncertainty of one-minute average values.

	STR-21G-S2
Sun Tracker	STR-21G-SET
Pyrheliometer	MS-57-SET-10-P-MR
Pyranometer Diffuse Irradiance	MS-80-SET-10
Pyranometer (GHI)	MS-80-SET-10
Shading disk assembly	MD-81-10
Top mounting plate	TMP-DT-80

Options	STR-21G-S2
Ventilation unit	MV-01
Pyranometer (GHI)	MS-80A / MS-80M

	STR-21G
Arms	1
Pointing accuracy Solar elevation: 0 to 87°	< 0.01 °
Angle resolution	0.009 °
Rotation angle Zenith	-15 - 95 °
Rotation angle Azimuth	0 - 360 °
Torque	12 Nm
Payload side arms	7.5 kg (Total payload 15kg)
Sun sensor FOV	30 °
Ingress protection IP	65
Operating temperature range	-40 - 60 °C
Communication	RS-422 / 232C

Power consumption	< 10 W
Power supply	21 to 31 VDC / 15W
Power supply (Power Adapter)	100 to 240 VAC / 20W
Dimensions mm	430 (W) x 380 (L) x 440 (H)
Weight	14.5 kg (With tripod)
Motor	Stepper motor
Driving technology	Harmonic drive®
Tracking mode	Solar position / Free positioning
Tripod	Table tripod
Pyrheliometer mount	Adjustable / One position
Cable length	10 m

Options	<b>STR-21G</b>
Cable length Power cable	20 / 30 m
Cable length Communication cable	5 / 10 m
Shading assembly Disk	MD-81-10 (MS-80)
Top mounting plate A (1 position)	TMP-S-(sensor model)
Top mounting plate B (2 positions)	TMP-D-(sensor model)

	<b>MS-80</b>
ISO 9060:2018	Class A
ISO 9060:1990	(Secondary Standard)
Sub-category "Spectrally flat"	Compliant
Sub-category "Fast response"	Compliant

Output	Analog (mV)
Response time 95%	< 0.5 Sec.
Zero off-set a) 200W/m <sup>2</sup>	+/- 1 W/m <sup>2</sup>
Zero off-set b) 5K/hr	+/- 1 W/m <sup>2</sup>
Complete zero off-set c)	+/- 2 W/m <sup>2</sup>
Non-stability change/1 year	-
Non-stability change/5 years	+/- 0.5 %
Non-linearity at 1000W/m <sup>2</sup>	+/- 0.2 %
Directional response at 1000W/m <sup>2</sup>	+/- 10 W/m <sup>2</sup>
Spectral error	+/- 0.13 %
Temperature response -10°C to 40°C	+/- 1 %
Temperature response -20°C to 50°C	+/- 1 %
Tilt response at 1000W/m <sup>2</sup>	+/- 0.2 %
Sensitivity	Approx. 10 $\mu$ V/W/m <sup>2</sup>
Impedance	< 45000 $\Omega$
Operating temperature range	-40 - 80 °C
Irradiance range	0 - 4000 W/m <sup>2</sup>
Wavelength range	285 - 3000 nm
Ingress protection IP	67
Cable length	10 m

Options	MS-80
Cable length	20 / 30 / 50 m
Ventilation unit	MV-01
Albedo mounting kit	MS-albedo Kit

	MS-57
ISO 9060:2018	Class A
ISO 9060:1990	First Class
Sub-category "Spectrally flat"	Compliant
Sub-category "Fast response"	Compliant
Output	Analog (mV)
Response time 95%	< 0.2 Sec.
Zero off-set a) 200W/m <sup>2</sup>	0 W/m <sup>2</sup>
Zero off-set b) 5K/hr	< 1 W/m <sup>2</sup>
Complete zero off-set c)	< 1 W/m <sup>2</sup>
Non-stability change/1 year	-
Non-stability change/5 years	< 0.5 %
Non-linearity at 1000W/m <sup>2</sup>	< 0.2 %
Spectral error	+/- 0.2 %
Temperature response -20°C to 50°C	< 0.5 %
Tilt response at 1000W/m <sup>2</sup>	< 0.2 %
Sensitivity	Approx. 7 µV/W/m <sup>2</sup>
Impedance	< 15000 Ω
Operating temperature range	-40 - 80 °C

<b>Irradiance range</b>	0 - 4000 W/m <sup>2</sup>
<b>Wavelength range</b>	200 - 4000 nm
<b>Ingress protection IP</b>	67
<b>Cable length</b>	10 m

<b>Options</b>	<b>MS-57</b>
<b>Cable length</b>	20 / 30 m

Specifications are subject to change without further notice.