



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 pyrhemliometer, 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 pyrhemliometer 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 pyrhemliometer 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 |

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|------------------------------|-----------------------------------|
| 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 | STR-21G |
|------------------------------------|----------------------|
| 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) |

| | MS-80 |
|-----------------------------------|----------------------|
| ISO 9060 classification | Secondary Standard |
| Output | Analog (mV) |
| Response time 95% | < 0.5 Sec. |
| Zero Offset A 200W/m ² | < 1 W/m ² |

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|--|--------------------------------|
| Zero Offset B 5K/hr | +/- 1 W/m ² |
| Non-stability change/1 year | - |
| Non-stability change/5 years | +/- 0.5 % |
| Non-linearity at 1000W/m ² | +/- 0.2 % |
| Directional response at 1000W/m ² | +/- 10 W/m ² |
| Spectral selectivity 0.35-1.5µm | +/- 3 % |
| Temperature response -10°C to 40°C | < 0.8 % |
| Temperature response -20°C to 50°C | < 1 % |
| Tilt response at 1000W/m ² | +/- 0.2 % |
| Sensitivity | Approx. 10 µV/W/m ² |
| Impedance | < 45000 Ω |
| Operating temperature range | -40 - 80 °C |
| Irradiance range | 0 - 4000 W/m ² |
| 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 |

| | MS-80A |
|-------------------------|--------------------|
| ISO 9060 classification | Secondary Standard |
| Output | Digital (4-20mA) |

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| Response time 95% | < 1.5 Sec. |
| Zero Offset A 200W/m ² | < 1 W/m ² |
| Zero Offset B 5K/hr | +/- 1 W/m ² |
| Non-stability change/1 year | - |
| Non-stability change/5 years | +/- 0.5 % |
| Non-linearity at 1000W/m ² | +/- 0.2 % |
| Directional response at 1000W/m ² | +/- 10 W/m ² |
| Spectral selectivity 0.35-1.5µm | +/- 3 % |
| Temperature response -10°C to 40°C | < 0.4 % |
| Temperature response -20°C to 50°C | < 0.5 % |
| Tilt response at 1000W/m ² | +/- 0.2 % |
| Operating temperature range | -40 - 80 °C |
| Irradiance range | 0 - 4000 W/m ² |
| Wavelength range | 285 - 3000 nm |
| Power supply | 12 - 24 VDC |
| Power consumption | 0.08 - 0.5 W |
| Ingress protection IP | 67 |
| Cable length | 10 m |

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|------------------|----------------|
| Options | MS-80A |
| Cable length | 20 / 30 / 50 m |
| Ventilation unit | MV-01 |

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| | MS-57 |
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|---|-------------------------------|
| ISO 9060 classification | First Class |
| Output | Analog (mV) |
| Response time 95% | < 0.2 Sec. |
| Zero Offset A 200W/m² | 0 W/m ² |
| Zero Offset B 5K/hr | < 1 W/m ² |
| Non-stability change/1 year | - |
| Non-stability change/5 years | < 0.5 % |
| Non-linearity at 1000W/m² | < 0.2 % |
| Spectral selectivity 0.35-1.5µm | +/- 1 % |
| Temperature response -20°C to 50°C | < 0.5 % |
| Tilt response at 1000W/m² | < 0.2 % |
| Sensitivity | Approx. 7 µV/W/m ² |
| Impedance | < 15000 Ω |
| Operating temperature range | -40 - 80 °C |
| Irradiance range | 0 - 4000 W/m ² |
| Wavelength range | 200 - 4000 nm |
| Ingress protection IP | 67 |
| Cable length | 10 m |

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|---------------------|--------------|
| Options | MS-57 |
| Cable length | 20 / 30 m |

Specifications are subject to change without further notice.