# EKO
## EKO INSTRUMENTS CO., LTD.

| Single arm with GPS | Dual arm with GPS | High Torque Dual Arm with GPS |
|---|---|---|
| STR-21G | STR-22G | STR-32G |

**+ GPS**
*available !*

# Sun Tracking Systems

*Precise tracking, Accurate measurement*



## EKO INSTRUMENTS

# System Accessories

| | Item | Model | | | Item | Model |
|---|---|---|---|---|---|---|
| 1 | Sun Tracker ( Single Arm ) | STR-21G | | 13 | Tripod for STR-32G | STR-32-T |
| 2 | Sun Tracker ( Dual Arm ) | STR-22G | | 14 | Shading Ball Assembly ( Single Type ) | MB-12-1 |
| 3 a/b | Sun Tracker ( High Torque Dual Arm ) | STR-32G | | 15 | Shading Ball Assembly ( Dual Type ) | MB-12-2 |
| 4 | Top Mounting Plate for one Pyranometer | TMP-S-XXX (∗) | | 16 | Shading Ball Assembly for WISER (MS-710, MS-712) | MB-13-2 |
| 5 | Top Mounting Plate for two Pyranometers | TMP-D-XXX (∗) | | 17 | Pyrheliometer | MS-56 |
| 6 | Top Mounting Plate for WISER (MS-710, MS-712) | TMP-WISER | | 18 | Pyranometer | MS-802, MS-402, MS-410, MS-802F, MS-402F |
| 7 | Mounting Plate for a Pyranometer ( Normal Incidence ) | STR-22-SMP | | 19 | Spectroradiometer | MS-712 |
| 8 | Extra Pyrheliometer Mount | STR-22-AD | | 20 | Spectroradiometer | MS-710 |
| 9 | Mounting plate for MS-700DNI ( Primary ) | STR-22-P | | 21 | DNI Spectroradiometer | MS-700DNI |
| 10 | Mounting plate for MS-700DNI ( Secondary ) | STR-22-S | | 22 | Collimation Tube for MS-712 | STR-32-CT712 |
| 11 | Mounting plate for MS-712 Spectroradiometer ( Primary ) | STR-32-P | | 23 | Collimation Tube for MS-710 | STR-32-CT710 |
| 12 | Mounting plate for MS-710 Spectroradiometer ( Secondary ) | STR-32-S | | | | |

(∗) : Please contact EKO for more details.

# Specifications

| Model | STR-21G | STR-22G | STR-32G |
|---|---|---|---|
| | Single Arm | Dual Arm | High Torque Dual Arm |
| Motor | Stepping Motor | | |
| Driving method | Harmonic Drive | | |
| Accuracy | <0.01° (Soloar Elevation：0～87°) | | |
| Angular Resolution | 0.009° | | 0.000375° |
| Torque | 12 Nm | 24 (12+12) Nm | 60 (30+30) Nm |
| Payload | 7 kg balanced | 15 kg balanced | 60 kg balanced |
| Sun-sensor tracking accuracy | ±0.01° | | |
| Sun-sensor field of view | ±15° | | |
| GPS Sensor positioning start time | ~5min ( depends on the receiving condition ) | | |
| Operating Temperature | -30～+50℃ | | |
| Communication | RS-232C, 9600bps, 8N1 | | |
| Power requirement | 100-240VAC, 50/60Hz, 50VA (DC24VA version is optional.) | | |
| Dimension | 430(W) x 380(D) x 440(H)mm (main body+tripod) | 430(W) x 380(D) x 440(H)mm (main body+tripod) | 430(W) x 380(D) x 249(H)mm (main body) |
| Weight | 14.5 kg (main body+tripod) | 15.5 kg (main body+tripod) | 15.0 kg (main body) |

# Outline dimensional drawing (STR-22G *1)

*1 :The dimensions of the main body are the same for all three models.

Back View
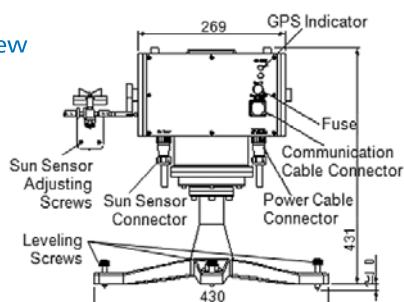
Left View
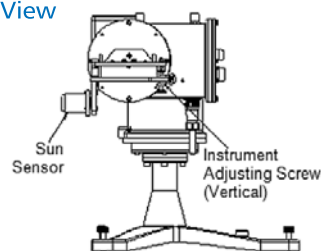
# Solar measurement configuration

## Direct Normal Incidence (DNI)

A compact measurement system based on STR-21G sun tracker and ISO 9060 first class pyrheliometer MS-56, which attained the world's fastest response time.

It perfectly suits for the evaluation of CPV (Concentrated Photovoltaic) and CSP (Concentrated solar Power).
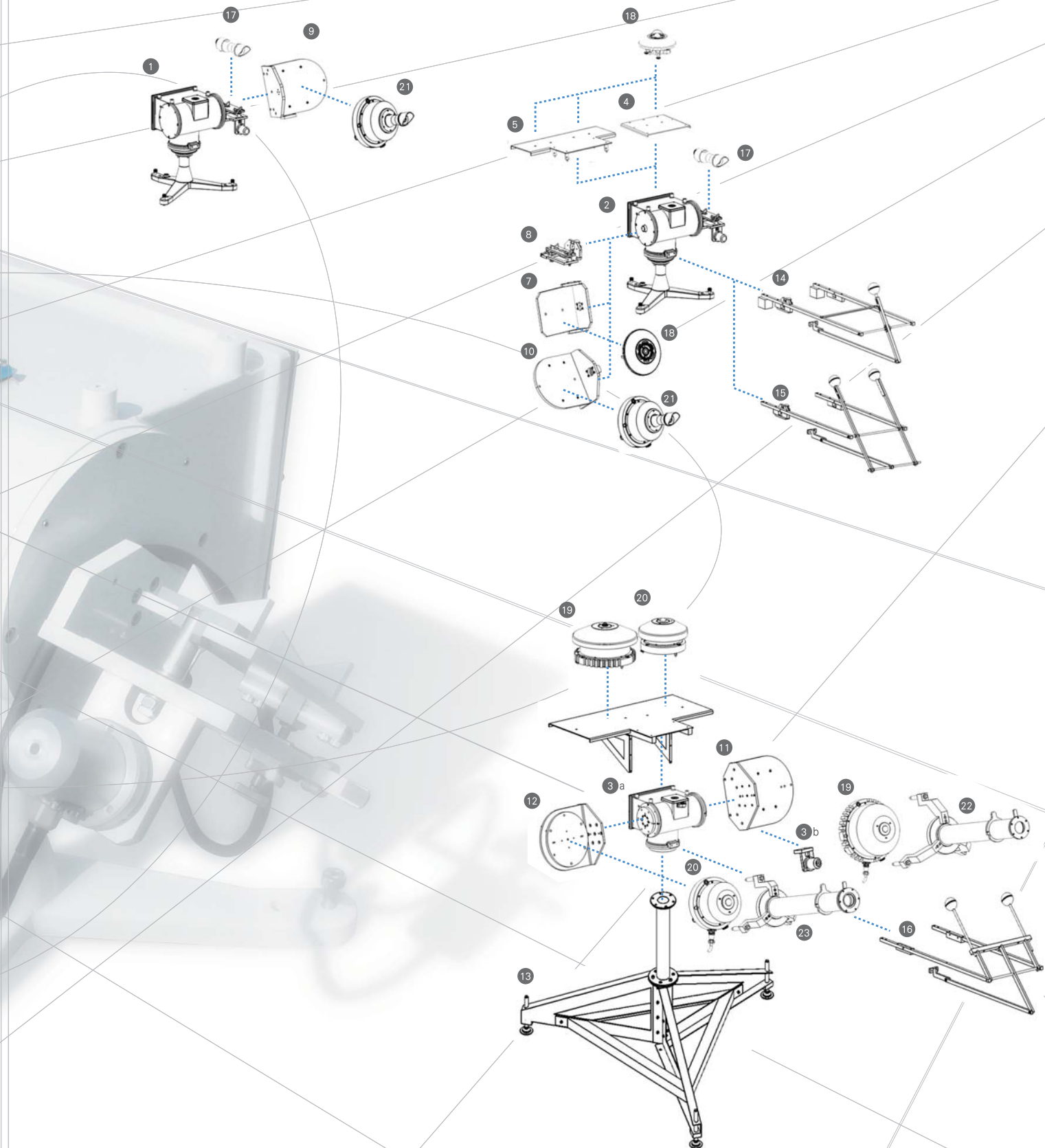
## Diffuse radiation (DHI)

The system is based on the STR-22G sun tracker, shading-ball MB-21, small size mounting plate and secondary standard pyranometer MS-802 to measure diffuse radiation (DHI). MS-56 pyrheliometer simultaneously measures the DNI.

## Spectral Direct Normal Incidence Irradiance

STR-21G Sun tracker with MS-700 DNI which provide direct spectral irradiance in the range 350-1050 nm.

STR-32G high torque sun tracker and MS-710 / 712 spectroradiometers with collimating tube provide direct spectral irradiance in the range 350 - 1700 nm.

# System Configurations

The compact STR sun trackers are perfectly suited to support all kinds of measurement sensors for measuring Global, Diffuse and Direct Radiation. The STR-21G and 22G Sun Tracker come with a small tripod that offers a stable surface for the measuring equipment and adjustable pyrheliometer mount for a fine alignment. Besides, various mounting kits are available to accommodate the MS pyranometer series or other types of pyrheliometers. The latest heavy duty STR-Sun Tracker STR-32G is capable of taking the highest load with maximum performance to support EKO's spectral measurement solutions.

EKO Instruments high precision STR Sun Tracker models STR-21G (single arm), STR-22G (dual arm) and STR-32G (high torque dual arm) provide high tracking reliability, enhanced functionalities with fully automated set up procedure through a built-in GPS receiver.

## Two independent sun tracking modes

The sun path can be determined by two independent methods, either by tracking the exact solar position through the sun sensor or calculating the position through the solar algorithm. If the sun is absent only the calculating mode will be activated. Based on the calculated solar position and actual position of the sun the STR will correct the angular difference and automatically compensate for any mis-alignment.

## Positioning function

Next to the basic sun tracking function, the STR-series can be fully controlled through the so-called "open command protocol". This allows to command the position of the tracker manually. By using a PC or data logger with RS-232 serial interface the sun tracker can easily be accessed.
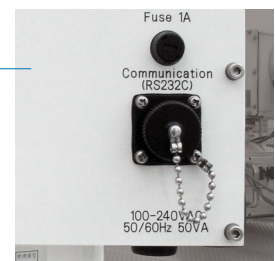
## Durable compact drive

High precision, maximum torque, small size and durability are the most valuable assets given by the Harmonic drives used inside the STR-Sun Tracker. Due to their high working efficiency, the motors are relatively small and use less power.
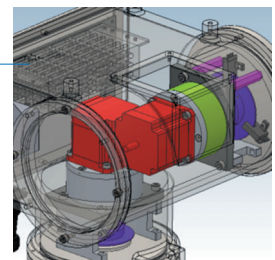
## Easy set-up

Due to the built-in GPS and integrated sun-sensor, installing the STR sun trackers gets most easy. Thanks to the embedded GPS, the position and time information is obtained automatically. Thank's to the integrated sun-sensor, orientation and leveling are no issues anymore (+/-15 degree acceptance angle).

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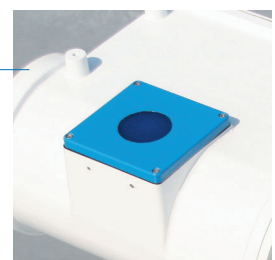
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