DEGER

# DEGER S100-AG-SR

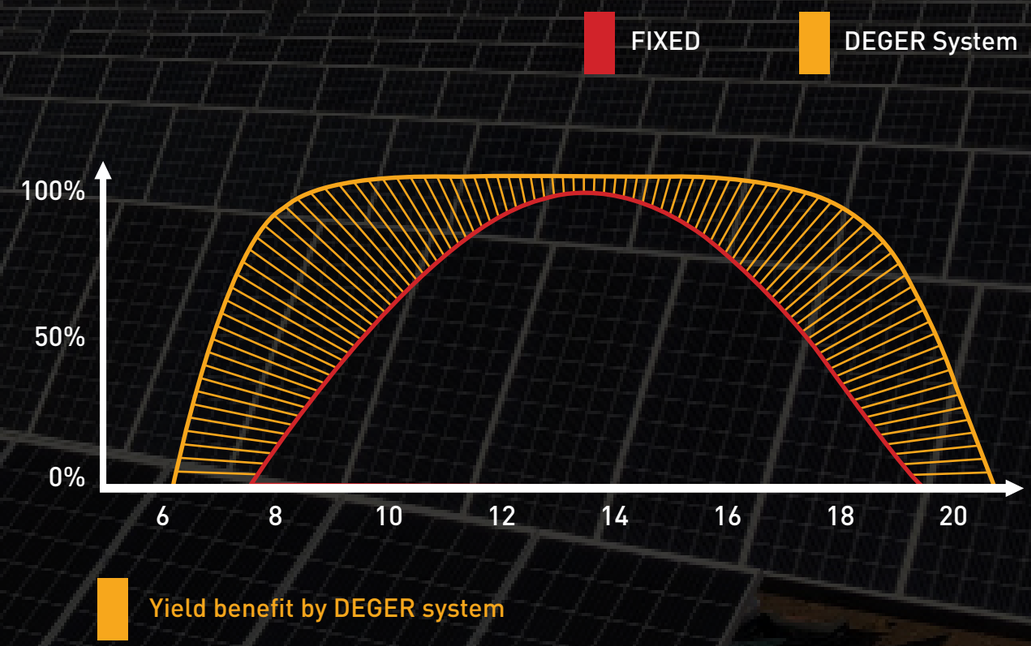
DATA SHEET

## WE ARE AT YOUR SERVICE WORLDWIDE


## Single-Axis Tracking System

Single-axis, active tracking systems from DEGER enable the optimal utilization of all the irradiation energy, suitable for all widely-sold solar modules. With the patented sensor-based MLD technology you can achieve yield increases of approx. 28.1% for all photovoltaic applications. An easy plug-and-play installation is realized by means of the stable supporting construction. The decentralized control enables maximum independence. DEGER systems are “designed in Germany”- and stand for quality and durability.

## Rating chart using a sunny summer day as an example



# ADVANTAGES

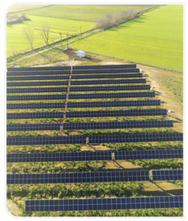
Distance module surface in horizontal position to ground: up to 3 m

Aluminium module support profiles available in two different heights: 85 mm and 100 mm.

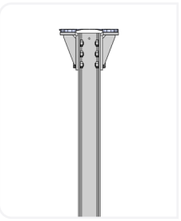
Hot dipped galvanized steel. In accordance with DIN EN ISO 1461-t ZN o.

Wind stability up to 140 km/h.

Non-linked rows.

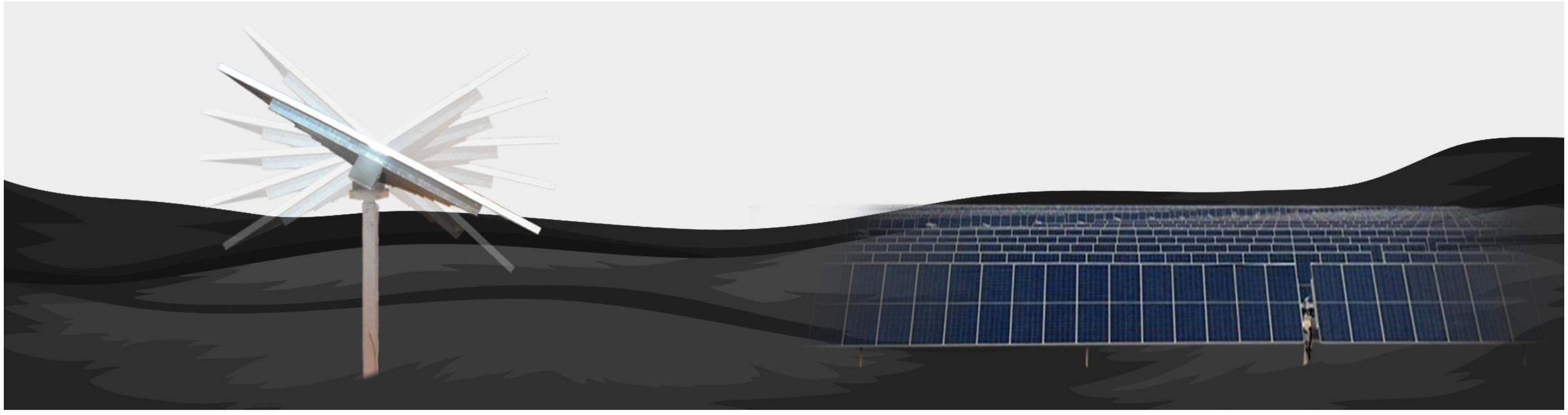


Low power consumption.



Usage of strong IPE and HEA ramming profiles. Roll forming profiles are not used on any DEGER trackers.

Robust and reliable tracking systems with heavy duty dampers.



Fast and simple plug-and-play installation.

High functional reliability and low-maintenance operation.

With two tracking systems controlled by a single control unit, fewer electronic components are required.

Tracking systems with 170 m² modul surface area.

# TECHNOLOGY

Maximum Light Detection (MLD) system, up to 30 % yield increase with MLD-Technology.

Automatic reset to sunrise position overnight.

Yield increase with Snow Sensor.

Possibility of data collection every single second.

Adjustable movement positions of the tracking system or backtracking function.

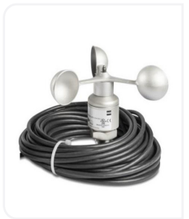
Various cleaning positions possible.

Adjustable wind speed limit (safe position) for each tracking system (maximum 12 m/s).

Possibility of setting sunrise and sunset angles for shadow management via DEGER CTC software.

Movement and wind/ snow alarm data saved via Microsoft Excel.

Possibility of individual tracking system management via DEGER CTC software.



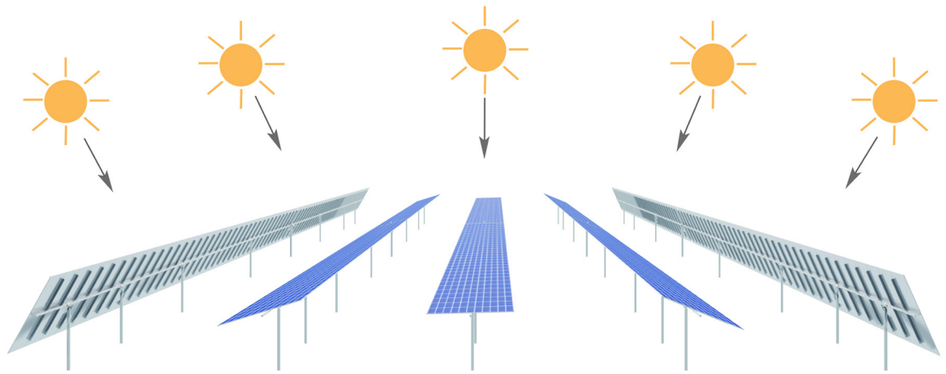
Wind protection with anemometer and MLD Sensor.

Sturdy Gearbox and DC motor technology.

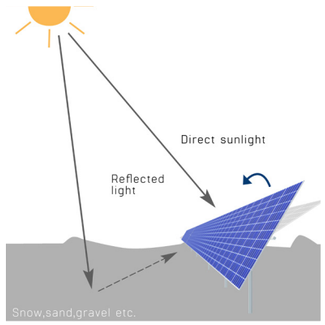
## MLD Technology

- **Intelligent Maximum Light Detection (MLD) system, up to 30 % yield increase with MLD technology.**

  Technology that is proactive gets more out of the sun. The light irradiation's intensity is influenced by a number of factors – primarily clouds, of course. That is why it is crucial that a smart control is able to react to the conditions accordingly. The MLD principle takes on that task.

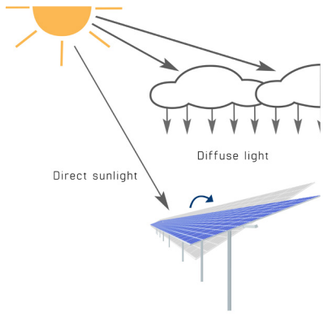


**Sunshine:** The DEGER system directly faces the sun all day.



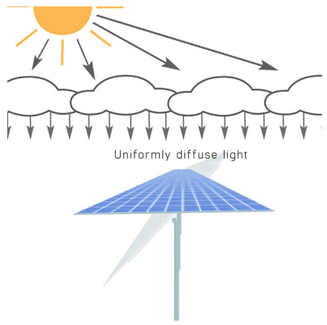

### Reflecting surface:

The DEGER system uses direct solar irradiation as well as energy from reflected light.



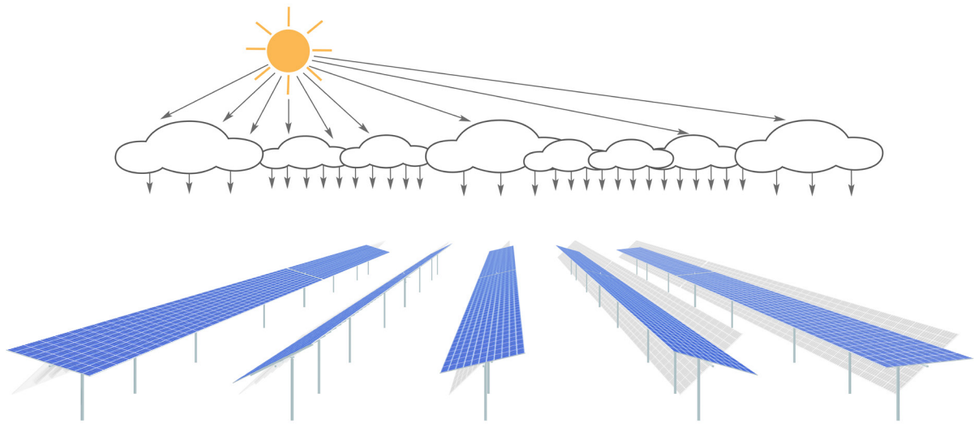

### Partly clouded:

In addition to the direct solar irradiation diffused light is also used to maximize the effect.




### Overcast sky:

The DEGER system catches all the diffused light by moving to horizontal position.

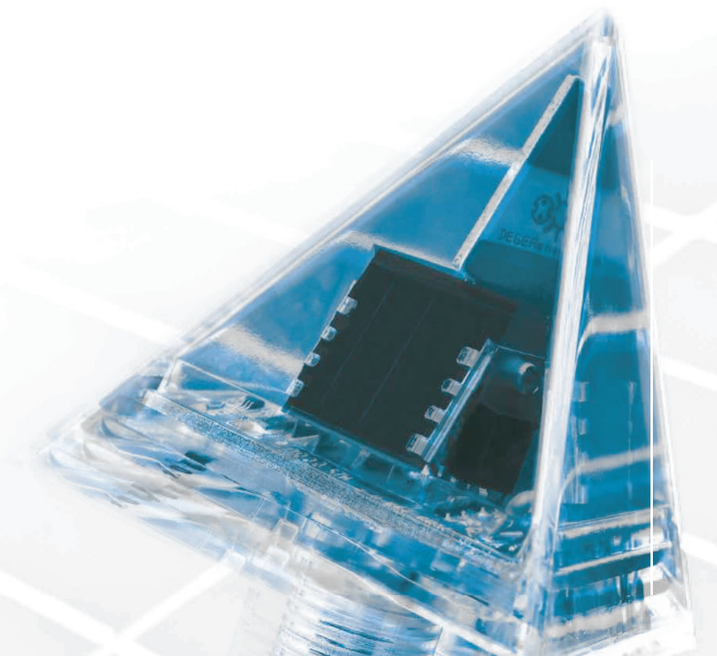


### Varying light conditions:

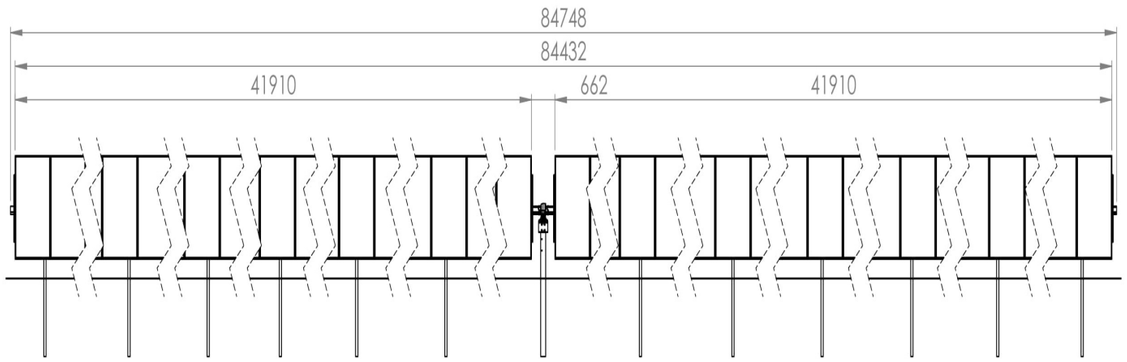
Because of different levels of cloudiness, the light conditions in solar park vary for each DEGER tracker. The individual control makes sure every DEGER system is optimally oriented to the brightest source of irradiation. This guarantees the highest energy yield possible.


MLD
MAXIMUM LIGHT DETECTION

The MLD-Sensor – the critical component in the MLD principle of controlling tracking systems.



# Technical Specification




DEGER S100-AG-SR
With Driven Pile Foundation[1]

## BASIC DATA

| | |
|---|---|
| Nominal output (depending on module) | Up to 40.000 Wp DC |
| Tracking type | 1-axis |
| Module surface (max.) | 170 m2 |
| Weight (total solar module weight) | Up to 2.601 kg |
| Approvals | CE, UL, CSA |

## STRUCTURE

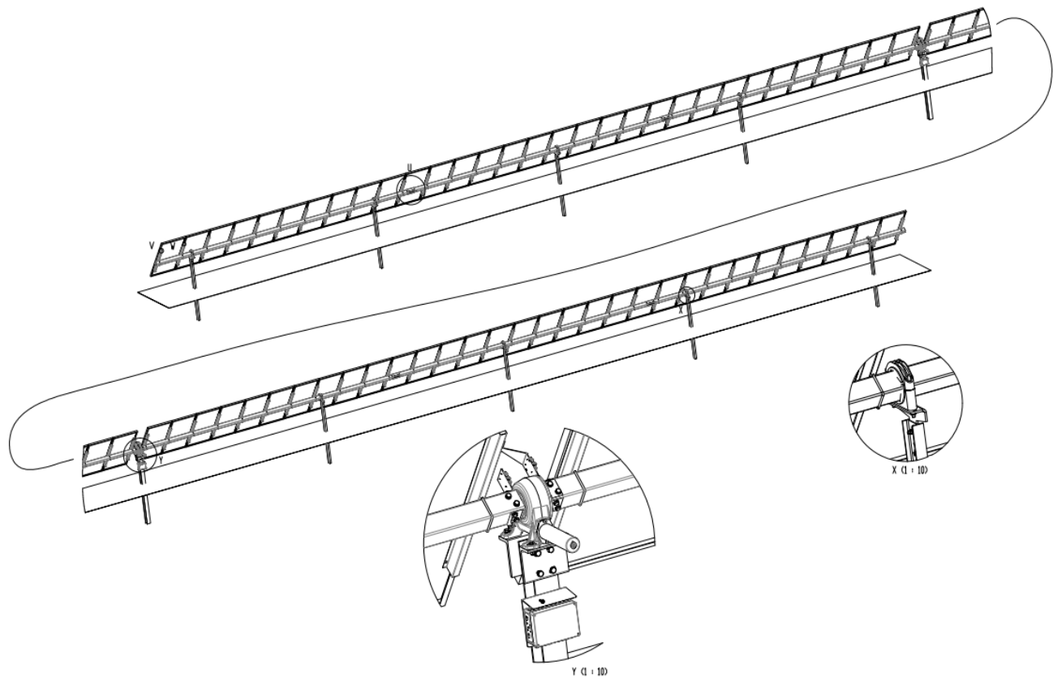
| | |
|---|---|
| Materials | Hot-Dip galvanized steel, aluminum, Special plactic |
| Galvanization | EN ISO 1461 or comparable |
| Bond-Type | Bolted connection, no welding on site |
| Certified statics | Yes |

## DRIVE

| | |
|---|---|
| Principle | Rotary drive |
| East-West angle | +50° / -50° |
| Spin speed | 18°/min. |
| Sound level (without load) | At a distance of 10 Meters: 20-40 Db(A) |
| Protection class | IP 67 |

## ELECTRONICS & CONTROL

| | |
|---|---|
| Operating voltage | 100 – 240 V AC / 100 - 380 V DC / 50 – 60 Hz |
| Rated input current | 0.8 A |
| Control | MLD-Technology |
| Protection class | IP 67 |



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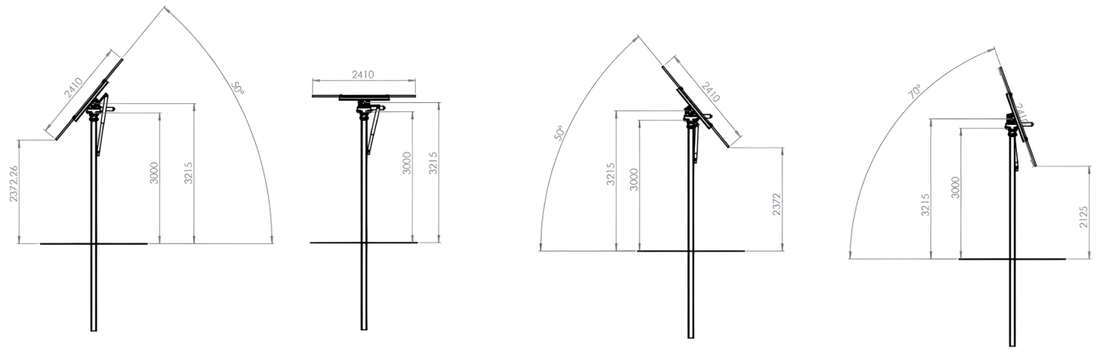



DEGER S100-AG-SR
With Driven Pile Foundation[1]

## POWER CONSUMPTION (APPROX)

| | |
|---|---|
| Control mode | 1 W |
| With running actuator | 50 W – 240 W |
| Internal consumption per year | 5 kWh |

## POWER OUTPUT

| | |
|---|---|
| Output voltage | 24 V DC |
| Output current (max.) | 5 A |

## CLIMATIC CONDITIONS

| | |
|---|---|
| Installation over sea level | max. 2000 m |
| Permissible ambient temperature | -20°C – +50°C |
| Humidity range | 5% – 95% |
| Permitted wind speed | Up to 140 km/h[2] |

## GROUND CONDITIONS

| | |
|---|---|
| Max. ground inclination East-West | 10° |
| Max. ground inclination North-South | 10°[3] |
| Subsoil requirements | Soil survey necessary |

## PILE DRIVING FLEXIBILITY

| | |
|---|---|
| Ramming accuracy related to axis | max. +/- 20 mm |
| Axis twist angle | max. +/- 5° |
| Ramming accuracy in height | max. + / - 10 mm |

[1] The depth of the driven pile foundation must be statically calculated. Pictured dimensions can change depending on the module size and/or number of modules per tracking system

[2] With full occupancy – Laid out with Planning Tool

[3] Tracker axis installed parallel to the ground

## SCOPE OF DELIVERY

Complete single-axis tracking systems, solar module carrier system made of steel or aluminium - matching the module type used, patented MLD control (Maximum Light Detection) with MLD sensor and assembly instructions.

## OPTIONAL SERVICES

Assembly support, trainings and on-site service.

## Comparative measurements: Up to 28.1% Yield Increase

In the comparative measurement four different systems for generating solar energy were examined in solar park Rexingen in southern Germany. The aim of the two-year study was to determine the efficiency and higher yield of the photovoltaic modules compared to fixed tilt installed, astronomic tracked and tracking by MLD sensors of single- and dual-axis systems.

### CONDITIONS

The efficiency of solar panels depends on various factors such as temperature, air pressure and radiation values. So that the comparison measurements were carried out under the same conditions, all four systems were installed on the former landfill in Rexingen and equipped with the same modules and inverters.
Measurement of yield was determined for two years and was carried out under the following parameters and performance

| | |
|---|---|
| Installation site | 48° 26‘50‘‘North, 8° 39‘48‘‘East |
| Elevation N | 569 meters |
| Irradiation | 1,010 kWh/kWp (PVGIS) |
| Installed modules | Per unit 36 modules<br>Sanyo HIP-215NKHE1 |
| Nominal power | 7.74 kWp |
| PV Inverter | Per unit one SMA SMC 8000TL |
| Nominal power | 8.0 kW |

### SYSTEM 1

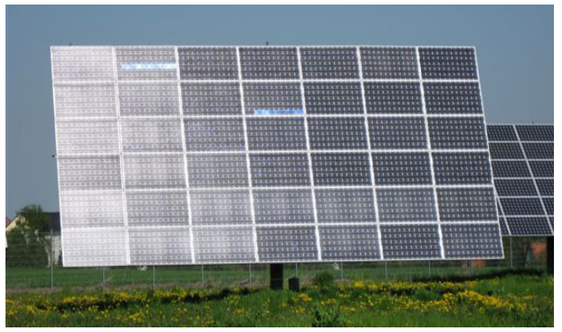
Fixed tilt installation 30° south-facing

### SYSTEM 2

Single-axis DEGER tracking system with MLD sensor

### SYSTEM 3

Dual axis astronomical controlled



### SYSTEM 4

Dual-axis DEGER tracking system with MLD sensor

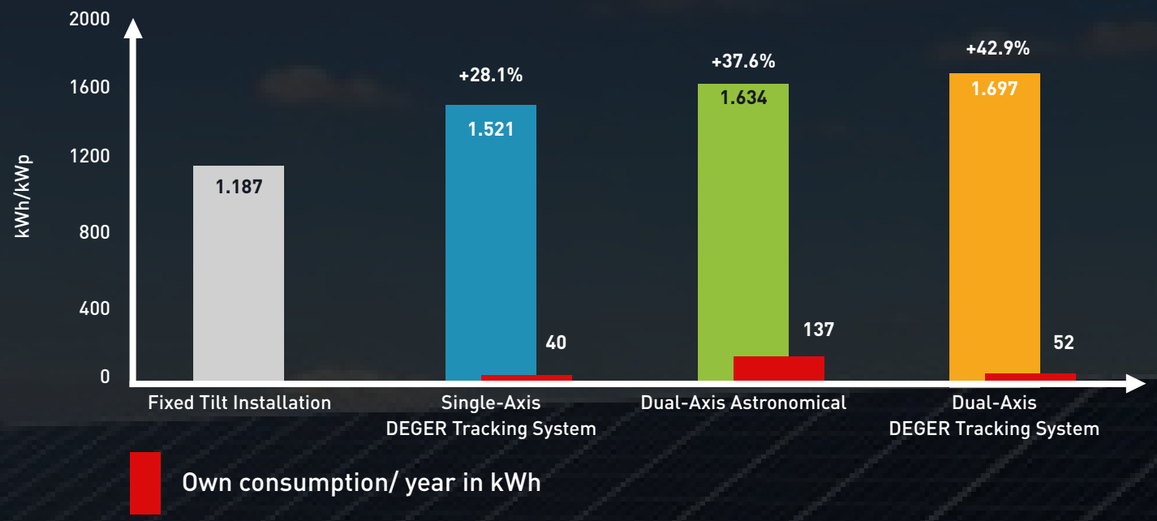
### ANALYSIS PROCEDURES

For the evaluation two different methods were used.
The normalization method, in which all performance variables such as cable length, actual module output, inverter efficiency and other similar variables are taken into account. By the evaluation with the standard method the yield takes into account a theoretical consideration of the cable losses resulting directly from the measured data without further corrective calculation.

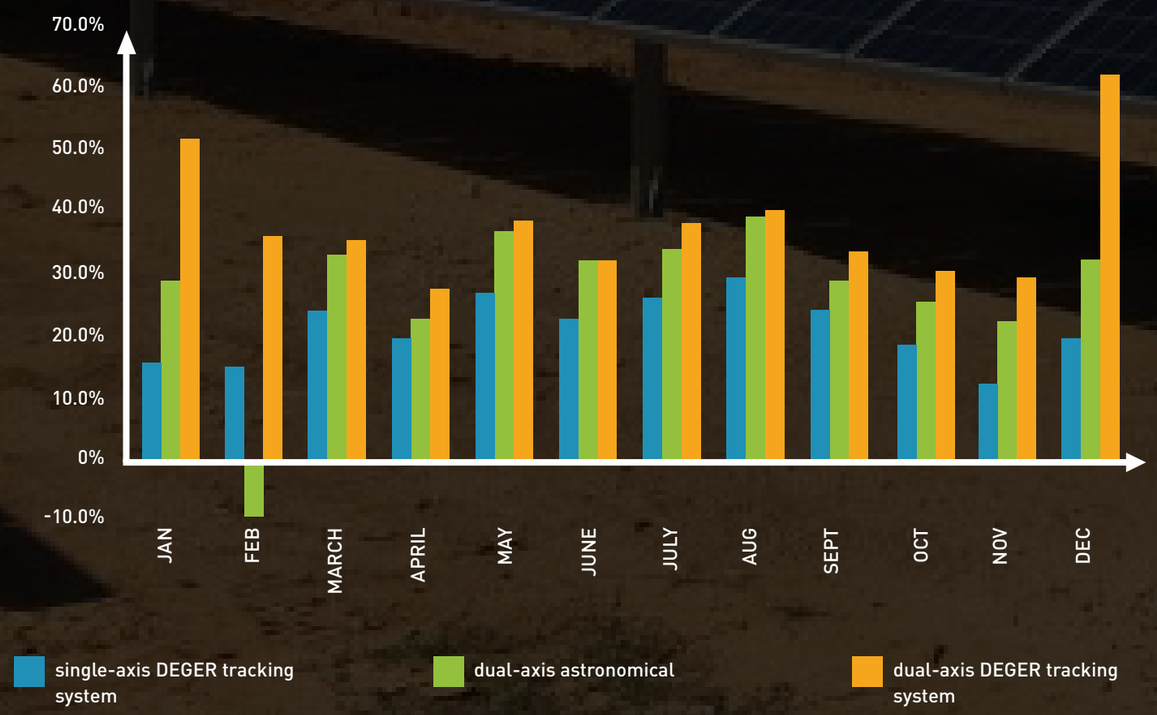
# Results

According to the one hundred percent availability of data in 2012 the following values are determined with the standard method:

**COMPARATIVE MEASUREMENTS IN 2012 IN SOLAR PARK REXINGEN**




**ADDITIONAL YIELD MONTHLY RESULTS IN 2012 COMPARED TO FIXED TILT SYSTEMS**




**ADDITIONAL YIELD MONTHLY RESULTS IN 2012 COMPARED TO FIXED TILT SYSTEMS IN PERCENT**

| | JAN | FEB | MAR | APR | MAY | JUNE | JULY | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| single-axis DEGER tracking system | 15.7% | 15.2% | 24.4% | 19.8% | 27.2% | 23.1% | 26.5% | 29.5% | 24.7% | 18.8% | 12.4% | 19.8% |
| dual-axis astronomical | 29.4% | -8.9% | 33.5% | 23.0% | 36.8% | 32.5% | 34.4% | 39.4% | 29.0% | 25.9% | 22.6% | 32.5% |
| dual-axis DEGER tracking system | 52.5% | 36.2% | 35.9% | 27.8% | 38.6% | 32.6% | 38.5% | 40.6% | 33.8% | 30.6% | 29.5% | 62.3% |

## THE RESULT OF THE STUDY

- DEGER single axis tracking system are generating a 28.1% higher yield compared with static systems,
- DEGER dual axis tracking system are generating a 42.9% higher yield compared with static systems,
- The two-axis and single-axis DEGER tracking systems generate 5.3% more energy than astronomically controlled tracking systems.
- DEGER tracking system have the lowest operating power consumption compared to the measured tracking systems in this study.
- During the winter, astronomically controlled units may not even outperform fixed systems when foggy or cloudy conditions are present. Only MLD technology senses that the diffuse irradiation is best captured with by presenting the most surface area possible.

DEGER

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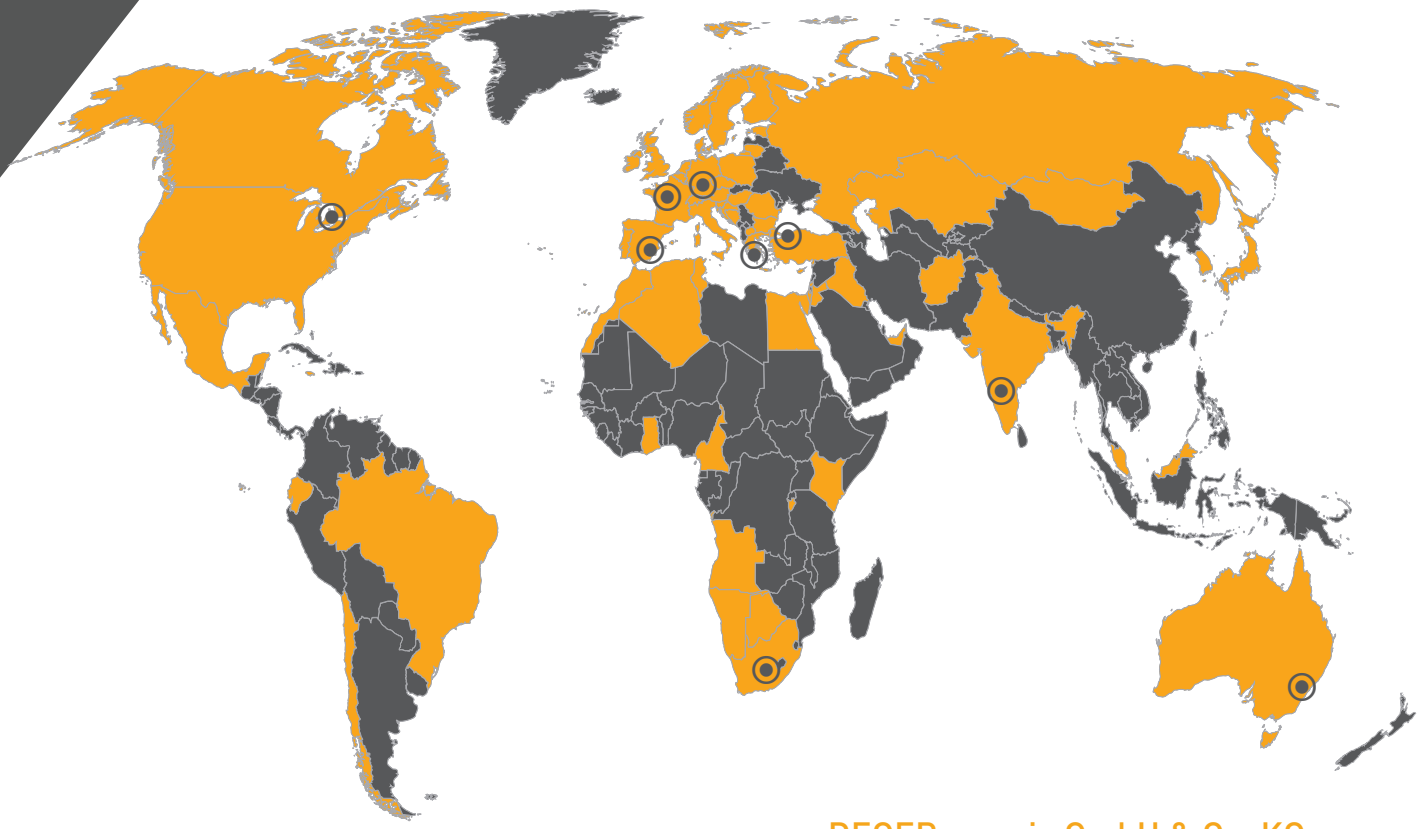

Sales and production locations

Installed DEGER systems


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