DEGER ENERGIE
SOLAR TRACKING SYSTEMS

PRODUCT GUIDE

Not only simply brilliant, but brilliantly simple

DUAL-AXIS MODEL

Open land and building integration

Two-axis, active tracking systems appropriate for all standard solar modules

Fields of application:

- For maximum cost-effective power generation
- For open land and building integration
- In high wind zones (HD series)

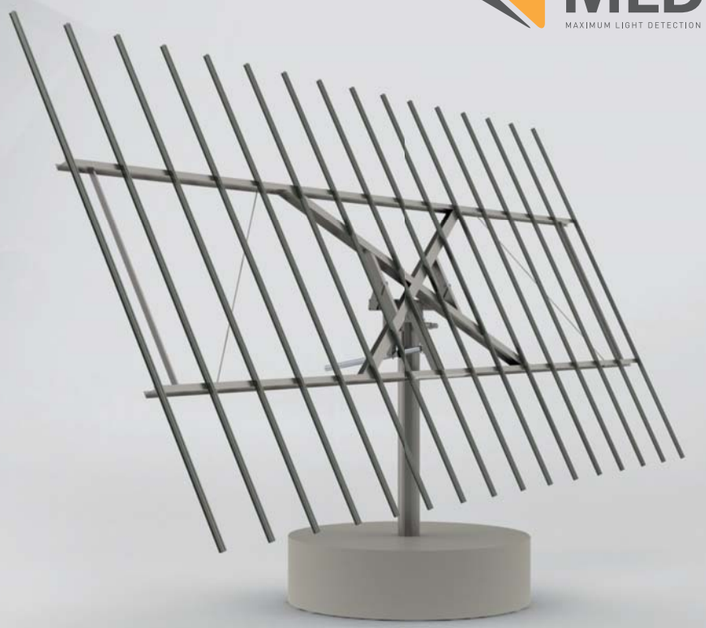
Scope of delivery:
Complete dual-axis tracking system, incl. aluminum module mounting system, suitable for most common modules, patented MLD (maximum light detection) control with DEGERconecter, wind guard, snow sensor (9000NT and 6000NT), foundation drawings and assembly instructions.

Example

DEGERtraker 9000NT

with concrete foundations for open land installation

MLD
MAXIMUM LIGHT DETECTION




1


2


3

1. 7000NT open land project
2. 5000HD parking lot solution
3. double usage of areas with DEGERtrakers

	NT series					HD series		CT series	
	DEGERtraker 9000NT	**DEGERtraker** 7000NT	**DEGERtraker** 6000NT	**DEGERtraker** 5000NT	**DEGERtraker** 3000NT	**DEGERtraker** 5000HD	**DEGERtraker** 3000HD	**DEGERtraker** 5000CT	**DEGERtraker** 3000CT
Rated power	8,000 ... 12,000 Wp	6,000 ... 10,000 Wp	4,000 ... 7,000 Wp	4,000 ... 7,000 Wp	2,000 ... 4,000 Wp	4,000 ... 7,000 Wp	2,000 ... 4,000 Wp		
Module area up to									
m^2	70.6	60	53	40	25	40	25	37.35	22.5
sq ft	760	645	570	430	269	430	269	402	242
Maximum permitted wind velocity									
km/h	102 ... 300*	102 ... 300*	130 ... 300*	102 ... 300*	102 ... 300*	167 ... 300*	167 ... 300*	167 ... 300*	167 ... 300*
mph	63 ... 186*	63 ... 186*	81 ... 186*	63 ... 186*	63 ... 186*	104 ... 186*	104 ... 186*	104 ... 186*	104 ... 186*
Approx. annual int. consumption	9 kWh	8 kWh	9 kWh	7 kWh	7 kWh	8 kWh	7 kWh		
Control	MLD	MLD	MLD	MLD	MLD	MLD	MLD	MLD CT	MLD CT
Open land	x	x	x	x	x	x	x	x	x
Building integration						x	x		
Mast length**									
m	4 m ... 5 m	3.3 m ... 5.5 m	4 m ... 5.5 m	3.3 m ... 5.5 m	3.3 m ... 5.5 m	3.3 m ... 5.5 m	3.3 m ... 5.5 m		
ft	13.1 ft ... 16.4 ft	10.8 ft ... 18 ft	13.1 ft ... 18 ft	10.8 ft ... 18 ft	10.8 ft ... 18 ft	10.8 ft ... 18 ft	10.8 ft ... 18 ft		
Weight (without mast)									
kg	1,250	1,090	1,000	650	600	950	650	1,600	1,100
lbs	2,756	2,403	2,200	1,433	1,323	2,094	1,433	3,527	2,400
Certification									
UL/CSA	x		x			x			
Article number	1910001	1700001	1600001	1500001	1300001	1510001	1310001	1520001	1320001
Fields of application	1, 3, 5	1, 5	1, 2, 3, 5	1, 5	1, 5	1, 2, 3, 5	1, 5	5	5

The systems are designed in accordance with DIN 1055-4 (03/2005) and partially tested under ASCE-7 and NBC or OBC (Canada). Project-specific assimilation to regional provisions. Technical modifications reserved in the interest of progress.
* designed with planning tool.
** including rotating head (0.6 m/2.0 ft).

Areas of application:

1 Europe
2 USA
3 Canada
4 Australia
5 on request

NT models: suitable for open land
HD models: suitable for open land, buildings and high wind zones
CT models: concentrator technology for CPV applications

SINGLE-AXIS MODELS

Open land and building integration

Example

DEGER TOPtraker® 8.5

with concrete foundations
for open land installation

MLD
MAXIMUM LIGHT DETECTION

1. 40NT open land project
2. TOPtraker® utility scale solar project
3. TOPtraker® roof mounting solution

	DEGER TOPtraker® 40NT	DEGER TOPtraker® 8.5
Rated power	4,000 ... 7,000 Wp	500 ... 1,300 Wp
Module area up to		
m^2	40	8.5
sq ft	430	92
Maximum permitted wind velocity		
km/h	102 ... 300*	130 ... 300*
mph	63 ... 186*	81 ... 186*
Annual int. consumption approx.	2.5 kWh	1 kWh
Controls	MLD	MLD
Angles of elevation	30°/optional 0° or 15°	30°/ optional 20°
Rotating angle east - west	+/- 45°	+/- 45°
Open land	x	x
Building integration		x
Mast length**		
m	4 m/optional 5 m	
ft	13.1 ft/optional 16.4 ft	
Weight (without mast)		
kg	650	125
lbs	1,433	276
Certification		
UL/CSA		x
Article number	1130001	1110001
Areas of application	1, 5	1, 2, 3, 5

Single-axis, active tracking systems appropriate for all standard solar modules

Fields of application:

- To increase power for all photovoltaic applications
- For open land and building integration

Scope of delivery:
Complete tracking system in the optimized azimuth axis, incl. patented MLD (maximum light detection) control with DEGERconecter, mast for TOPtraker® 40NT, aluminum module mounting system, suitable for most common modules, wind guard, foundation drawings and assembly instructions.

The systems are designed in accordance with DIN 1055-4 (03/2005).
Project-specific assimilation to regional provisions.
Technical modifications reserved in the interest of progress.
* designed with planning tool.
** including rotating head (0.6 m/2.0 ft).

Areas of application:

1 Europe
2 USA
3 Canada
4 Australia
5 on request

ADVANTAGES THAT PAY OFF

You can't always rely on the weather. But you can count on an intelligent control system.

STAND-OUT TECHNOLOGY

- Individually controlled trackers
- Optimal exploitation output in any weather situation
- Wind tunnel tested
- Low maintenance cost
- 99.9% availability
- On-site service
- Plug-and-play installation

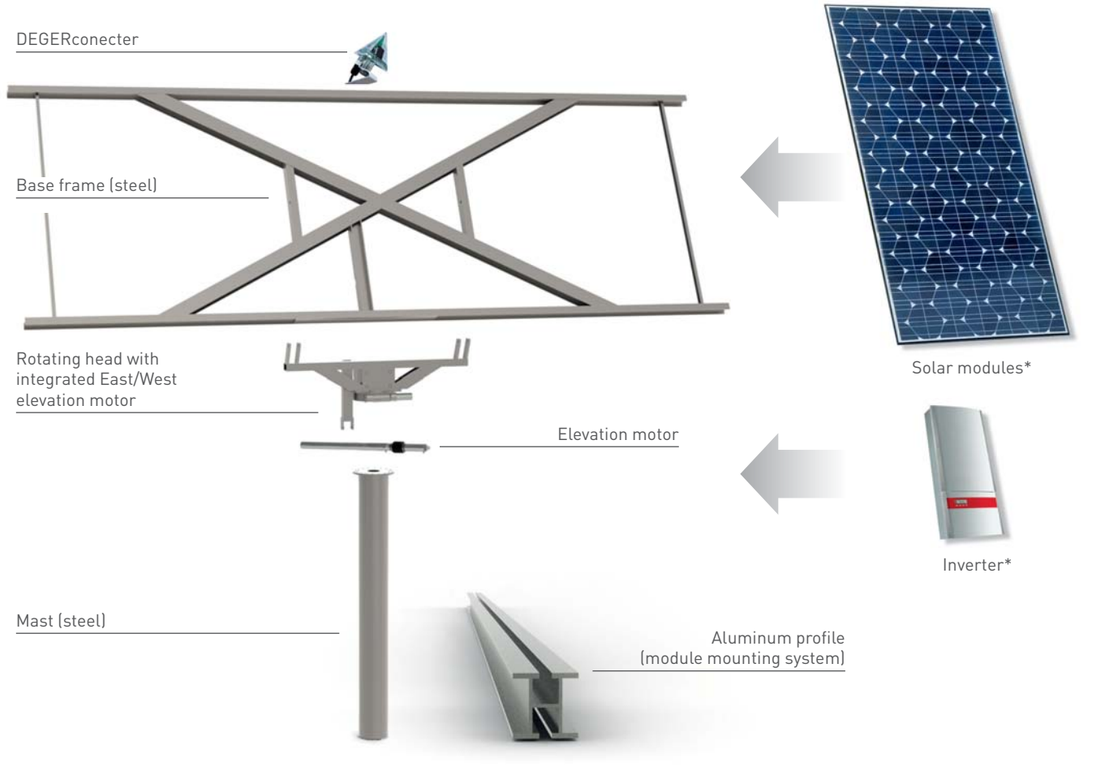
SAFE AND SUSTAINABLE INVESTMENT

- Calculable surpluses approx. 45%
- Investments and higher surpluses can be reliably calculated
- Presence in all major markets
- Planning security – extended warranty for all solar park sizes for up to 20 years
- Local production in countries in which we operate
- Largest product portfolio

SHORT FACTS

- On the market since 1999
- 2007: 10,000 DEGERsystems installed
- 2010: 35,000 DEGERsystems installed worldwide (version dated December, 2010)
- Installed capacity above 180 MWp (version dated December, 2010)
- Business certified under ISO 9001, statics tested under TÜV and certified according to UL/CSA directives
- Patented MLD technology

A SIMPLE STRUCTURE



* Not supplied

MLD TECHNOLOGY

DEGERconecter

TRACKING SYSTEM QUALIFIED FOR BEST PERFORMANCE
The maximum light detection or as we call it MLD principle, consists on the most accurate, fastest and energy-saving movement of modules, to the most energy-loaded positions. This is due to the patented control component, the DEGERconecter. The control component, continually measures intensity and angle of the incoming light, and moves the installation with the solar modules in the most advantageous way. The DEGERconecter thereby, takes into account not only the solar irradiation, but for example, light that is reflected of snow, water or bright rock, it also considers the diffuse solar irradiation that penetrates clouds.

For the operation of the DEGERconecter, two sensor cells deliver reference values, which are processed and evaluated by the integrated logic chip of the control component. A differential amplifier controls the transition from the logarithmic characteristic during strong solar irradiation, to a linear characteristic curve during low currents (as they occur in diffuse light). The logic module places a much higher value on the linear characteristic line, than on the logarithmic one. This leads to a significant increase in the readjustment accuracy, at decreasing brightness. The differential voltage is additionally charged with a load, whereby the cut-off threshold is set down to around 30 watts per square meter, and thus far into the evening hours.

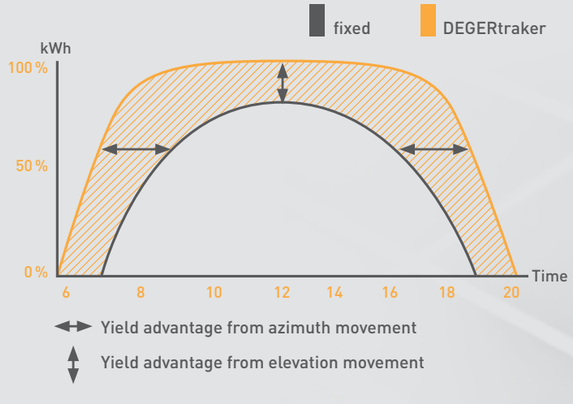
A third sensor cell, on the back of the DEGERconecter, ensures that the system is automatically set back again in the morning, in the direction of sunrise. In order to prevent both drives in dual-axis systems from running simultaneously, the system is designed in order that the east-west (azimuth) drive has priority over the north-south (elevation) drive.

Each dual-axis tracking system is equipped with two DEGERconecters. Due to the automatic tracking of each individual system, a central controller and a wiring of the park with data lines, is unnecessary. This has significant effects on the profitability of solar parks: MLD controls and directs every system independently, at all times in the entire park, this is to optimize the position for maximum results, it is prepared to act, even in fast and different changing levels of cloud cover. Each system achieves the highest possible level of energy efficiency, in each case. In addition, there is a safety factor: in case of a failure, only one system is affected; the remaining systems of the park continue to operate normally.

The patented DEGERconecter control, was awarded the Baden-Württemberg Prize for Innovation in 2001, has been continuously improved and has been used more than 60,000 times throughout the world.

ADVANTAGES

- ▸ No background computer
- ▸ Systems operating independently of one another
- ▸ Less installation and wiring expenses
- ▸ No need for electromechanical components such as encoders, relays, stepped motors etc.
- ▸ Straightforward, easily-mastered control technology
- ▸ Poor weather conditions are also used efficiently
- ▸ Movements are executed only if they result directly in an increased energy yield



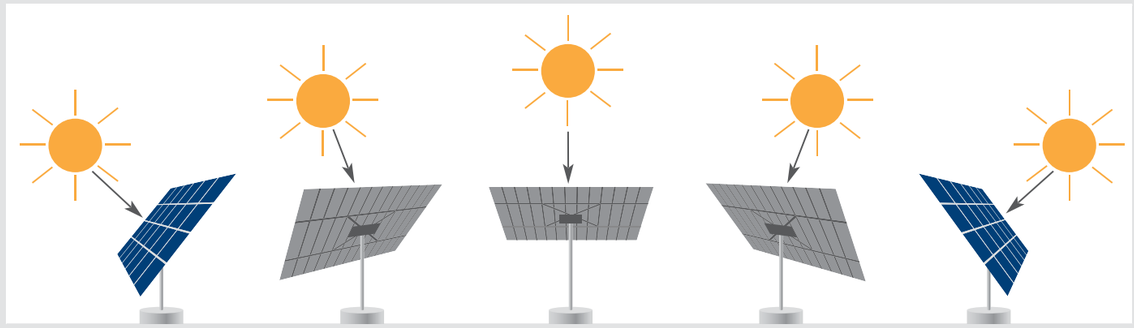
Rating chart using a sunny summer day as an example

THE INTELLIGENT CONTROL

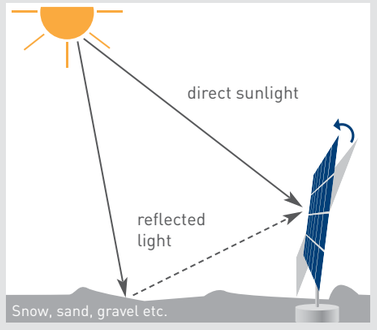
MLD technology

MLD technology
Astronomical control

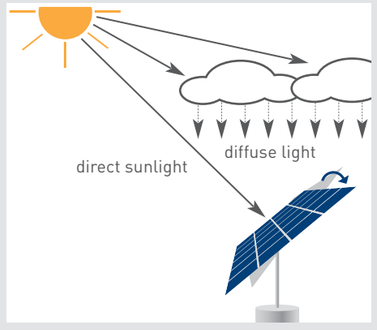
The efficiency of a solar plant depends essentially on how much energy the solar cells are able to collect. The intelligent control of the DEGERtraker guarantees the optimal utilization of irradiation.



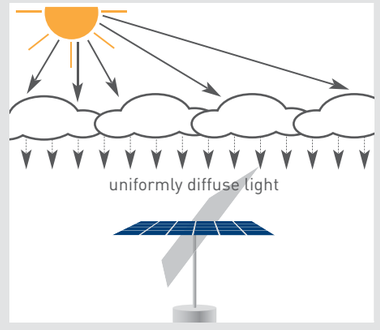
Sunshine: The DEGERtraker directly faces the sun all day.



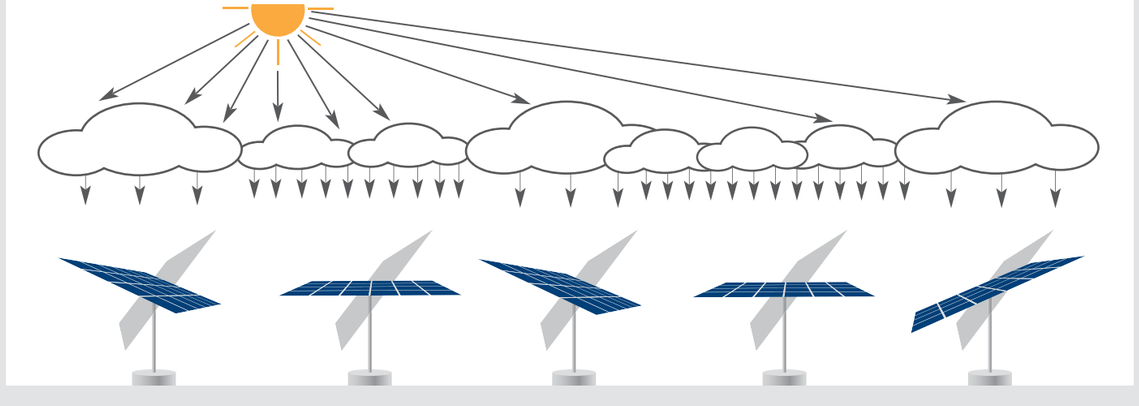
Reflecting surface: The DEGERtraker uses direct solar irradiation as well as energy from reflected light.



Partly clouded: In addition to the direct solar irradiation, diffused light is also used to maximize the effect.



Overcast sky: The DEGERtraker catches all the diffused light by moving to horizontal position.



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

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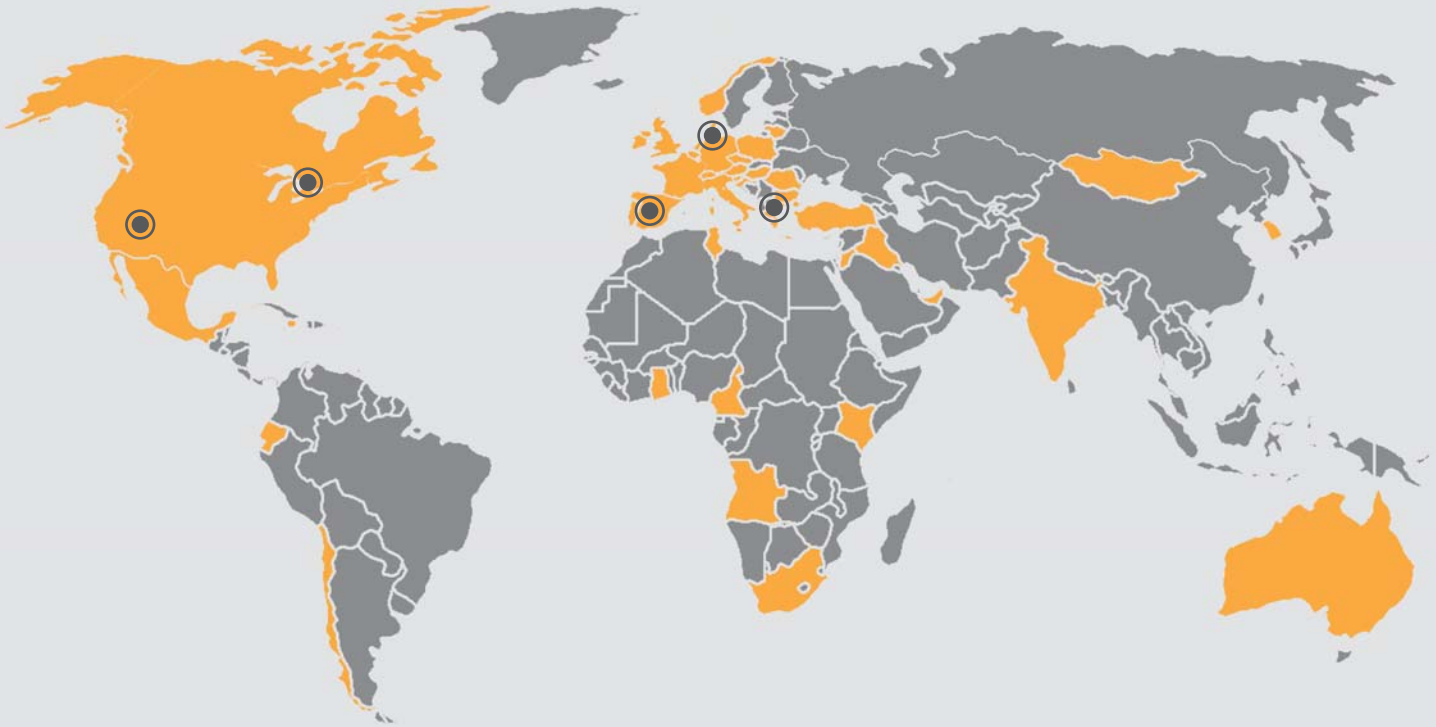

Sales and manufacturing sites

DEGERenergie GmbH
Solar Tracking Systems
Industriestr. 70
72160 Horb am Neckar
GERMANY

DEGERenergie Greece
ATHENS

DEGERenergie Spain & Portugal
BARCELONA

DEGERenergie USA
PHOENIX

info@DEGERenergie.com
www.DEGERenergie.com

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