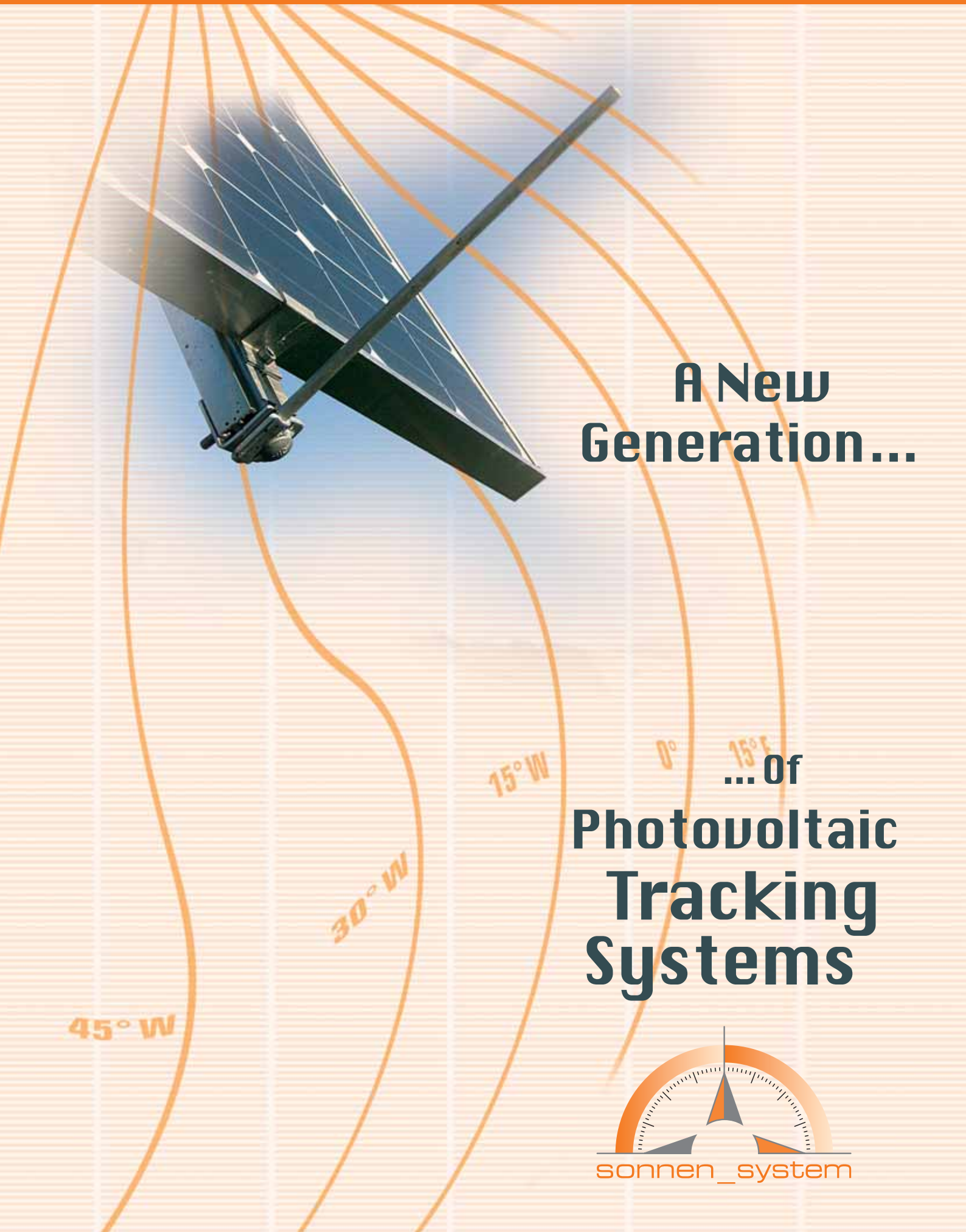
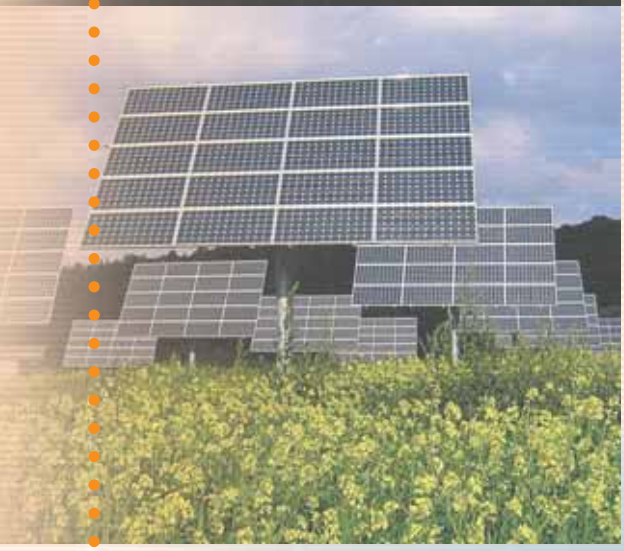


A New Generation...

...of Photovoltaic Tracking Systems

sonnen_system



The new generation of photovoltaic tracking systems

During the last few years, photovoltaic tracking systems have established themselves as an exciting new type of photovoltaic technology. What started as experimentation soon became a full-fledged business. Thousands of systems by various manufacturers have been installed world-wide, and the experiences gained have led to the development of a new generation of tracking systems.

The **sonnen_system** was developed to increase the efficiency of photovoltaic systems while reestablishing safety as the main priority.

In the past few years the development of tracking devices has been dominated by the desire to reduce costs. Unfortunately, this led to compromises which were made at the lost of safety.

We decided to take a different path and have thus developed a new, safe tracking system.

The Safety Concept

Storms and lightning have always been the main cause of damage to photovoltaic tracking systems, causing long-term system outages and damages; costing millions of dollars to repair. The new comprehensive safety concept of the **sonnen_system** secures your investment – no matter where.

The Tracking Concept

Decentralized sensors undoubtedly have their place in individual systems. But numerous sensors are superfluous when building several systems. The **sonnen_system** possesses SMA control technology that enables precise astronomic tracking.

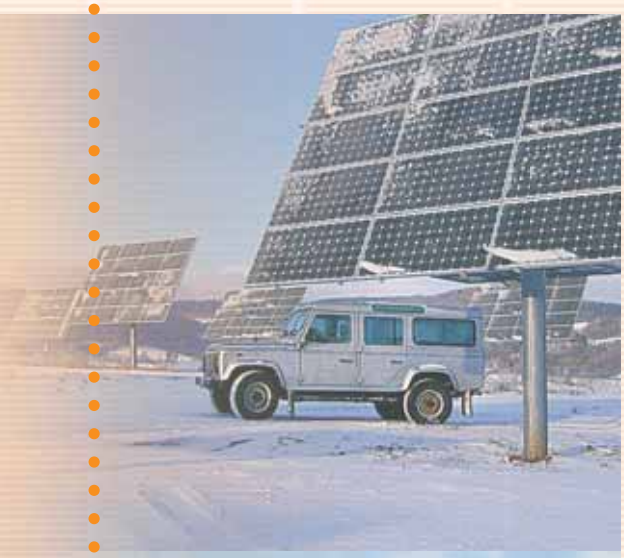
The Inverter Concept

Each tracking device employs an SMA inverter, allowing for a reduction in system outages and an optimization of maintenance.
The control of the tracking device takes place in combination with the SMA inverter.

The Communication Concept

The **sonnen_system** is integrated into the communication of the inverters, which allows for an easy determination of errors and operating conditions. Remote maintenance and control take place via the SMA WebBox.

sonnen_system



Solid Reliability

No compromises have been made regarding the reliability and quality of the drive elements. Leading manufacturers were selected for the respective drive technologies in order to **ensure one thing: the safety of the investment**.

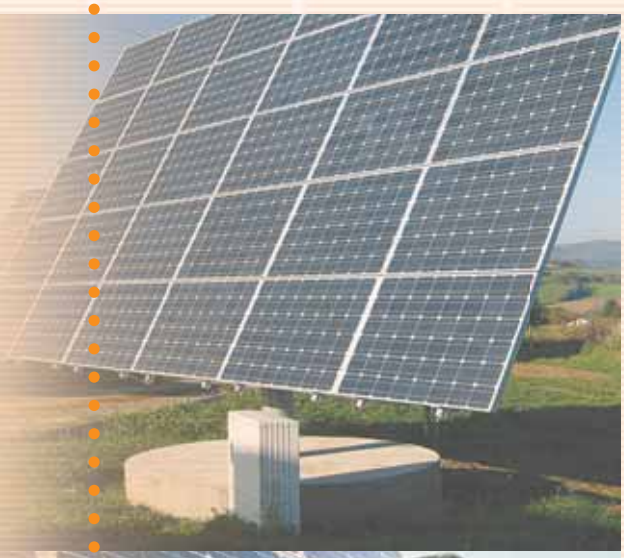
Both drive axles employ **high-performance electronic motors and planetary gears**. For over 50 years, our supplier has stood for the highest quality and reliability in motor engineering. This motor manufacturer has even been selected to supply international space-exploration projects.

The **east-west axle** employs gears and bearings used primarily in construction machines, cranes and wind-power installations (on and offshore). Our standard gearbox has been used thousands of times over worldwide, establishing itself as a proven machine component.

A linear drive powers the **elevation**. The manufacturer of this drive is the first choice for electrical drives that need to provide high power and long running times. Its core business is the construction of facades and equipping of pressure machines.

All drive-component suppliers have **decades of experience** and provide excellent service. This means that you will never be left alone, not even with difficult problems, because you need **reliable partners** for an investment that lasts over 20 years.

All parts and components are **Made in Germany**.



Construction

The specification for designing our dual-axle tracking system was simple:
Ensure that the customer can sleep well in even the stormiest weather.

We strictly followed this specification, even if there were opportunities to cut corners. Ball bearings, supplemental joints and anchoring blocks are just a few of the details that set the **sonnen_system** apart from other systems.

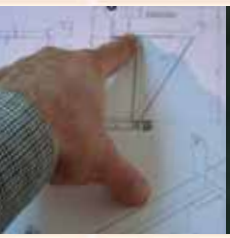
The sturdiness of the entire tracking system was tested to the point of destruction. The development team simulated enormous forces when constructing the prototype.

Based on these results, the system will be certified by a Nuremberg testing institute. The **sonnen_system** can be installed at a height of up to 25 m in wind-load zone 1. It is thus **the only system** on the market **that can be installed on buildings up to 20 m high**.

Control

The control was designed in cooperation with **SMA**. Along with the inverter, the control is an essential component of the **sonnen_system**. Thanks to this cooperation with SMA, the inverter communication can also be used to monitor the tracking device.

Remote maintenance and various back-up functions are controlled via the inverter communication system. The operating status and error logs can be read over the internet.



Fail-Safe

A back-up controller that communicates with the system independently of the inverter is component part of every system, enabling us to guarantee a **high degree of fail safety for our unique product**.

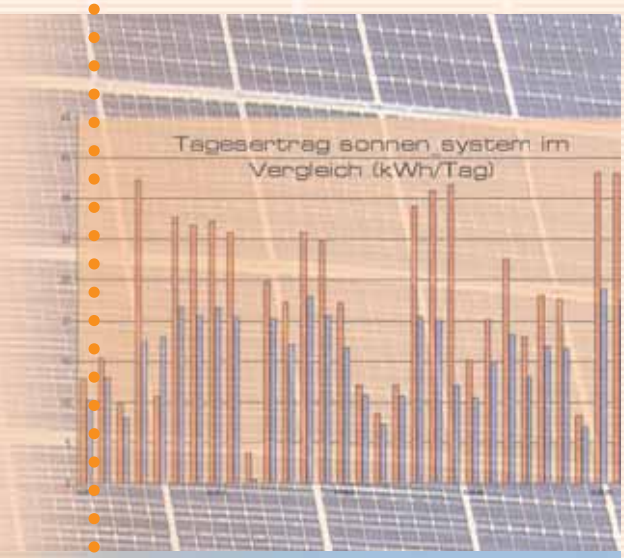
Track-Back Process

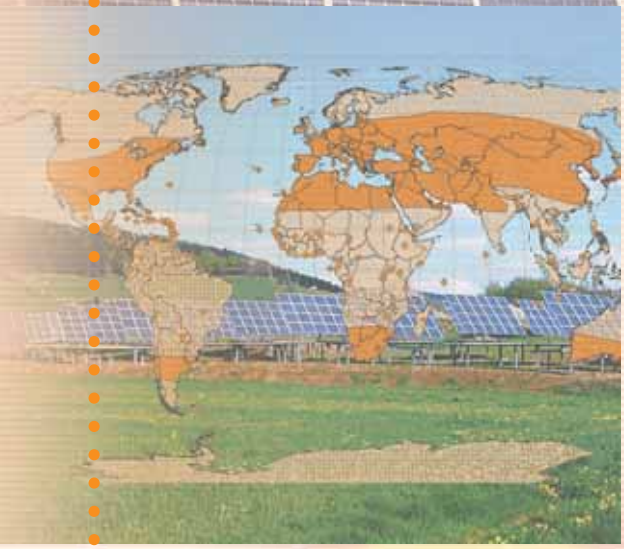
The control is an astronomical control adapted to the latitude of the individual assembly. With a special track-back process, the **losses arising**, when the tracking systems cloud each other – and the associated loss in profit **can be reduced significantly**.

Lightning Guard

Every system is equipped with an integrated lightning guard. Our lightningguard concept was developed together with experienced insurance experts.

An additional benefit is that **the insurance risk assessment will yield a positive result**.





Higher Energy Yield

The energy yielded from a tracking PV system depends on multiple factors. Engineering and array play an important role. But the essential factor is the location.

At Alheim, Germany (51°N / 9°E) two independent scientific studies confirmed **additional yield of 35%**, thanks to our technical design and implementation.

The more direct sunlight on a PV system, the higher the yield of energy. Experiences have shown that **45 % more energy** may be yielded in especially sunny regions. An exact prognosis of the additional energy can be prepared individually for each project. Thanks to these calculations, the investment risk is minimal.

Regions

Electricity is needed throughout the world, and a reliable supply of electricity is the desire of every society. Tracking PV systems can make their contribution, but it is not necessarily worthwhile to install tracking systems everywhere.

One can generally assume that **tracking systems can be used effectively between 23° and 55° latitude**. Whether this is actually possible at the planned location and whether the economic conditions are favorable must be determined in each case individually.




Service and Maintenance

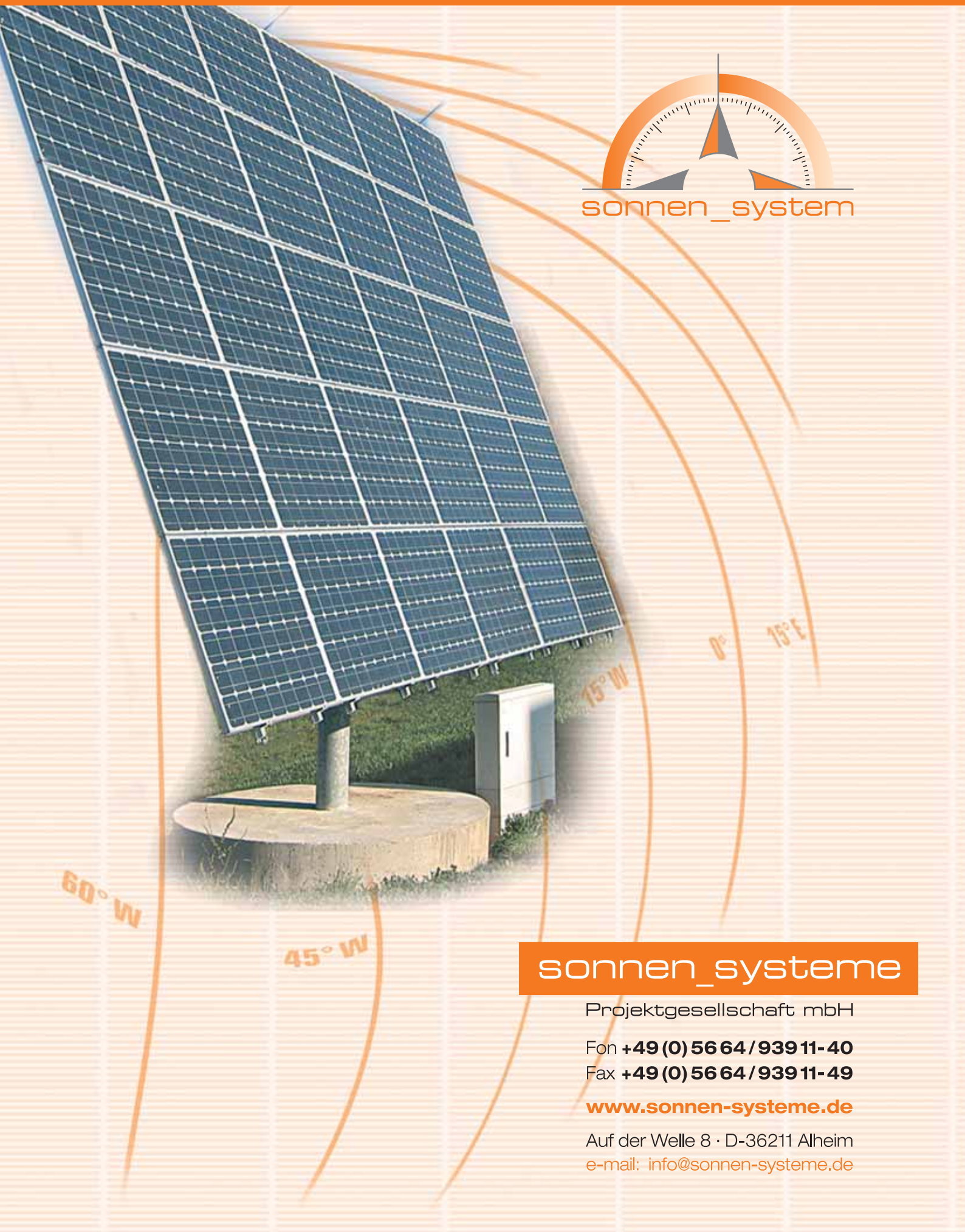
Because we specialize in tracking systems, **our service team deals daily with this complex technology** and the real-world consequences of its use. Internal training sessions and technical courses conducted by our renowned suppliers ensure that our team **remains at the latest state of solar technology**.

Warranty

The tracking device, the drive elements, the inverter, and the control come with a five-year parts guarantee.

sonnen_system at a glance:

- **dual-axle tracking system for panel areas from 40 m² to 60 m²**
- **ground and building mounting**
- **can be mounted up to 25 m on buildings in wind load zone 1**
- **astronomical controller from SMA**
- **monitoring integrated into SMA communication systems**
- **wind and sunlight sensors**
- **central redundant back-up control with back-up power supply**
- **integrated lightning guard**
- **track-back programming for clouding-optimized operation**
- **easy-to-assemble construction**
- **compact packaging**
- **one-year maintenance interval**



sonnen_systeme

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