Solutions for Solar Energy
- Incremental Encoders
- Absolute Encoders
- Linear Measuring Technology
- Inclinometers
- Customer Specific Solutions
Kübler products for solar energy. Rugged and reliable.

Solar plants will be more and more a constant element of our infrastructure and environment. Not only the thousands of photo-voltaic elements already visible on the roof of many houses worldwide, but also the impressive solar fields of hundreds of heliostats placed in wide and uninhabited areas too, producing hundreds of megawatts by converting the sun’s energy into high-temperature heat using different mirror configurations.

Encoders and other measuring systems used for the control of the mirrors must withstand a variety of harsh environmental challenges. The key-factor is the continuous and efficient operation of the plants. Downtimes, poor operating performance and replacements cause not only waste of time but are a sensitive cost-efficiency factor.

The Kübler Group manufactures its products with the goal to withstand the toughest environmental challenges. Rugged construction and innovative technologies combine to give reliable performance to the installation and assure efficiency in the energy generation process.
The Kübler Group belongs today to the leading specialists worldwide in the fields of position and motion sensors, counting and process technology as well as transmission technology. Founded in the year 1960 by Fritz Kübler, the family business is now led by the next generation of the family, his sons Gebhard and Lothar Kübler. Proof of the strong international focus lies in the fact that exports currently account for over 60 percent of turnover, with 9 international group members and distributors in more than 50 countries. Over 380 dedicated people worldwide, of whom 290 are in Germany, make this success possible. They ensure that customers can place their trust in our company. The Kübler Group has a clear, long-term strategy to continue as an independent, owner-managed family business.
Elevation and azimuth position control of heliostats

The Sendix rotary encoders have been specially designed for outdoor applications with their compact die-cast housing technology, wide temperature range (from -40°C to 85°C) and high IP protection rate of up to IP67. They can be used in stand-alone systems or can be integrated into drives. Heliostats in particular demand high precision and therefore the optical Sendix encoders are the best option for this type of application. The Sendix family offers all types of interfaces - incremental, SSI, BISS-C or all common Fieldbus protocols - depending on the automation network.

A power tower converts sunlight into electricity to be distributed through the grids. This technology uses many large, sun-tracking heliostats to concentrate sunlight on a receiver positioned on the top of a tower. A heat transfer fluid or molten salt heated in the receiver is used to generate steam, which is directed into a turbine generator to produce electricity.

An important contribution to the efficiency of the system depends on the positioning accuracy of the heliostats in elevation and azimuth. The heliostats are typically positioned in desert areas and the equipment is exposed to environmental factors such as large temperature differences between day and night, high temperatures during the day and constant dust presence. The maintenance operation and possible downtimes must be reduced to the lowest level possible.
The tough Safety-Lock™ bearing design ensures a long service life and high resistance to shock and vibration. The robust housing design and the wide temperature range ensure reliability outdoors. Whether installed into the drive or as a stand-alone system, the Sendix encoders offer a rugged and accurate measuring system for elevation and azimuth angles.

- Sturdy bearing Safety-Lock™ Design
- Optical accuracy and resolution up to 5000 PPR
- Compact and tough die-cast housing
- Large range of mounting and installation solutions
- IP67 and operating temperature range from -40°C to +85°C
- Mechanical identification of the Z-Pulse possible

Inclinometers

Elevation and azimuth control in photovoltaic installations have low accuracy requirements. Therefore inclinometers are an ideal economical alternative. The IS series has an extraordinarily compact and robust plastic housing, together with a high protection class IP68. The temperature range goes from -40°C to +80°C. Those sensors use analogue or CANopen outputs for 1 or 2 dimensional inclinations. Depending on the version, different measurement ranges are possible. Programmable vibration suppression, calibration accuracy (at 25°C) ± 0.1° and zero point adjustment are further highlights of the IS inclinometers.
Angular position control of Parabolic Trough Systems

The measurement of the angular position of Parabolic Trough Systems can be carried out using robust and simple magnetic encoders or with inclinometers, depending on the installation space available. For installation directly on the shaft, the standard Sendix magnetic rotary encoders can be used. The Limes system with customised magnetic bands is the solution for applications with very restricted installation space. Inclinometers offer the easiest installation directly on the panel.

A parabolic mirror concentrates the sun’s energy, thanks to its curved surface, onto a receiver pipe running along the inside of the curved surface. This energy heats oil flowing through the pipe, and the heat energy is then used to generate electricity in a steam generator.

The parabolic trough belongs to a field including hundreds of them in parallel rows aligned on a north-south axis. Each one follows the sun on a single-axis from east to west, keeping the sun rays continuously focused on the receiver pipes. Here it is best to use a simple, rugged and flexible measuring system.
**Limes: linear measuring systems**

- Very robust system, with extreme shock and vibration loadings
- Max. IP69k protection rate with encapsulated electronics
- Very small amount of installation space needed
- Index-pulse reference available on the magnetic band
- LED to check alignment on the band without instruments
- Withstands cyclic humidity according to moisture test as per EN 60068-3-38, and damp heat test as per EN 60068-3-78
- Custom-designed bands or rings

The Limes LI20/LI50 fulfils the requirements for CSP - parabolic trough installations. Small dimensions and non-contact sensor technology make it a flexible measuring system. Custom design for optimal integration. The index pulse available on the magnetic band allows for fast position recovery after downtime or maintenance.

**Magnetic Sendix sinlgeturn encoders**

- Robust housing technology with Sensor Protect™ system with encapsulated electronics
- IP69K and wide temperature range from -40°C to +85°C
- High shock (> 500 g) and vibration resistance (> 30 g)
- Up to 12 bits sinlgeturn resolution
- Interfaces: analogue 4 ... 20 mA or 0 ... 10 V, CANopen, SSI
- Configurable measuring range and output characteristics on request

Absolute measuring gives unique position reference along the whole tracking movement. The housing design ensures long service life in outdoor use. Easy installation and troubleshooting with detection LED.

**IS inclinometers**

- Extremely compact and robust construction
- Measurement of 1 or 2 dimensions
- Measuring range up to 360° (1 axes version)
- Configurable measuring ranges on request
- Zero point adjustment
- Insensitive to magnetic disturbances
- Analogue or CANopen interface; other interfaces on request

Absolute measuring gives unique position reference along the whole tracking movement. The housing design ensures long service life in outdoor use. Easy installation and flexible use thanks to the different interfaces.
Customised drive and control solutions

Our OPS department offers complete drive and control solutions for your applications. With a network of strategic partners we cover all aspects of the automation chain for solar applications.
Our range includes specific measuring systems, integrated drives, digital and analogue feedback systems as well as complete drive solutions.

Integrated drive solutions

Complete system with motor, gears and controller from a single source specially designed for your application:
- Intelligent bus-compatible drives systems
- Custom-designed compact drives
- Integration of the firmware into the application control

Application examples

- Custom integrated for Fresnel installations
- Spindle-type linear actuators for elevation adjustment
- Integrated measuring system with high-precision drive for parabolic troughs
- Compact drive with integrated fieldbus controller
- Custom position feedback systems with mechanical integration solution
Kübler Design System

The Kübler Design System is a method approach to your solution. Working together with your engineering team, we will develop a customised solution with components designed solely for outdoor applications.

We are your partner from the initial analysis of the requirement through to the final industrialisation of your product.

Our services for your project

- Analysis / design
  - Understanding climatic conditions
  - Define required precision
  - Installation and maintenance concept
  - Solution to extend service life of the system
  - Prototype and approvals with on-site technical assistance
  - Industrialisation and logistical service adapted to the specific needs of solar projects

Example of a Fresnel installation

Advantages of customised integrated drive solutions

- High reliability as all components are selected and designed-in for outdoor environments
- Special focus on longer service life in the definition of the product
- Simple installation of the system thanks to high integration level
- Solution developed to ensure easy maintenance under the specific conditions of a solar plant
- Warranty and support from a single source
- Reduced cost of ownership

www.kuebler.com/solarenergy
Technologies for solar energy

Innovations come from experience. Kübler products benefit from 50 years experience in automation engineering. Over the years they have undergone ongoing development and been optimised for use in drives, in outdoor and offshore applications and not least in solar energy.

Small details make a big difference. Our products feature many intelligent, high-quality extras, which offer our customers technical advantages which give a significant contribution to the availability of the plant and reduction of downtimes.

Rugged bearings: Safety-Lock™

The Sendix encoders offer higher reliability and longer service life, offer a very sturdy, rugged bearing construction as a result of the Kübler Safety-Lock™ technology. Encoders with Safety-Lock™ tolerate installation errors and high loads on the shaft, such as occur with wide temperature fluctuation or vibration. Interlocked, positive-fitting bearings, large bearing spans and a special assembly technique make a contribution here.

Magnetic sensor technology

Magnetic sensors are particularly robust while having a compact structure. The magnetic technology allows fully encapsulated electronics and thus an IP69k protection. They offer a particularly economic solution for short strokes, applications requiring a high repeatability accuracy or for manual position monitoring.

Optical encoder technology

100 percent resistant to magnetic fields – extremely compact design. Even strong magnetic fields, as occur in the vicinity of brakes or drive motors, pose no problems for the sensor technology of optical encoders. The technology dispenses with any components that may be susceptible to magnetic influences and allows for high scanning rates. The multiturn gear module – developed from special materials – is effective thanks to its double bearing layer and the specially developed gear teeth, resistant against wear, and can be used for high speeds up to 9000 rpm. As a result of the proven drive, the encoder has no need of a battery to store the number of revolutions.

Seawater resistant

Although it has already proved itself in harsh environments, the Sendix encoders family has been tested and certified according to the IEC 68-2-11 standards about resistance to the effects of salt-spray water over a period of up to 672 hours – the highest test level. The high certification level for the Sendix encoders gives further reliability for a high level of resistance against corrosion.

Shock and vibration resistant

Kübler encoders avoid serious, expensive failures right from the start – even with increased levels of axial loading, shock and vibration. This can eliminate enormous service costs and expensive downtimes in plants and installations worldwide. The high IP protection level makes these devices less sensitive to wet conditions outdoors, and for temperatures between -40°C and +90 °C or for altitudes over 3000 meters above sea-level.
Housing technology for outdoor use

The strong die cast housing of the Sendix encoders has extra thick walls. It is fastened to the encoder flange by multiple crimping. The high protection (up to IP69k) and the wide temperature range from -40°C to +90°C allow an outdoor use without any problem. The die cast housing has a very strong base, on which the connector flange is fastened with four screws. The Sensor-Protect™ design of the M36 encoders allows, thanks to entirely compound-filled electronics, the highest protection, IP69k. Thanks to the separate mechanical components with mechanically protected shaft and labyrinth seals, no additional protection is required in case of steam or highpressure cleaning.

Fixing and connection solutions

Kübler offers a wide choice of standard fixing and connection options, with which the desired encoder variants can be combined in a modular design principle. In addition to this individual, customised solutions can be worked out.

Insensitive to interference: OptoASICs

The resistant Kübler OptoASIC technology offers a very high integration density of components. This means, on the one hand, that the average reliability in the application can be increased significantly and, as a further benefit, the technology offers proven quality EMC characteristics and shock resistance.

Electrical interfaces

Kübler encoders boast a wide variety of interfaces. Along with incremental interfaces such as TTL / HTL and SinCos there are also absolute interfaces such as SSI and BiSS-C. Absolute encoders with field bus interfaces such as CANopen, PROFIBUS, PROFINET and EtherCAT are also available. The outputs and supply voltage are short-circuit protected.
Kübler Service for planning dependability

Fast, reliable service and professional advice have top priority at Kübler. We are globally on your doorstep in 8 service and application centres and offer our customers planning dependability. Our processes and services are certified and are constantly being improved.

Technical Hotline

Our Hotline will answer your technical questions Mon-Fri within normal working hours:

+49 7720 3903-35

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- Kübler Poland +48 6 18 49 99 02
- Kübler Turkey +90 216 999 9791
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10 by 10

With our 10 by 10 Service we will manufacture and deliver 10 encoders (catalogue products so marked) within 10 working days – 365 days a year - with the exception of 24th Dec. until 2nd Jan.

The benefits to you: Easier to order, the delivery can be calculated, flexibility for small production batches.

48 h Express Service

Short delivery times, a high level of on-time delivery, guaranteed quality and enthusiastic, service-oriented employees – these are what our customers can depend on.

We can process your order within 48 hours; we can ship stock items the same day.

Sample and Repair Service

The Kübler Service Centre can quickly manufacture special, customised versions within a short space of time. We are happy to help you with the practicalities of using our products – at your location if desired. We can carry out repairs within a maximum of 5 working days.

Kübler online – www.kuebler.com

- Up-to-date product and company information
- Product finder – the selection tool that helps you finding quickly the suitable product
- Download service for catalogues, brochures, operating instructions, software and CAD data
Tailor-made solutions – Kübler Design System

« With the KDS method our customers receive a lasting solution to lowering costs, reducing the number of models available or eliminating quality deficiencies. With KDS we develop product and engineering solutions together. The method stands out because of its structured process; this delivers innovation through experience and cooperation with the customer. »

Gebhard and Lothar Kübler, Managing Directors Kübler GmbH

The Kübler Design System – satisfying customer demands

Customer demands
- Long service life
- High-performance product
- Simple installation and maintenance
- System and process quality
- Optimised investment costs

Technology
- Optimal sensor technology
- Optimal product adaptation
- Optimal integration

Methodology and experience
- Kübler competency in methodology and project management
- Reduction in customer R&D costs
- Combination of Customer and Kübler Expertise
- Speeding up of the development process

Service
- Complete systems
- Engineering Service
- Logistics

The 4 phases of the Kübler Design System

Analysis, Demands
- Definition of the requirements
- Product requirements
- Timetable
- Target costs

Design
- Technology
- Functions
- Performance characteristics

Prototype, Test
- Quickly realized prototype and/or specific customer drawing
- Testing of the prototype in the application
- Support by Kübler application team during test phase
- Customer approval

Industrialisation, Production
- Implementation of production and quality processes
- Logistics/packaging
- Ongoing quality controls
- Continuous improvement (Kaizen)

« We were able to considerably reduce our average delivery time and I can confirm that delivery schedules were always adhered to. Technical support is very professional, efficient and not at all bureaucratic. »

Purchasing Manager, German Producer of Geared Motors
Product information

We offer additional information on our products and system solutions in the following main catalogues:

Position and Motion Sensors
- Incremental Encoders
- Absolute Encoders
- Linear Measuring Technology
- Inclinometers
- Functional Safety
- Connection Technology
- Accessories

Order-No. German  R.100.568
Order-No. English  R.100.569

Counters and Process Devices
- Pulse Counters and Preset Counters
- Hour Meters and Timers
- Frequency Meters and Tachometers
- Combination Time and Energy Meters
- Position Displays
- Process Displays and Controllers for Temperature, Analogue Signals and Strain-Gauge
- Setpoint Adjuster

Order-No. German  R.100.156
Order-No. English  R.100.157

Transmission Technology
- Slip rings
- Optical fibre signal transmission modules
- Cables, connectors and pre-assembled cordsets

Order-No. German  R.600.948
Order-No. English  R.600.948.001
Solar Energy