



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.





Kübler Headquarters, Villingen-Schwenningen, Germany



Encoders for Solar Energy

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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 8 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.

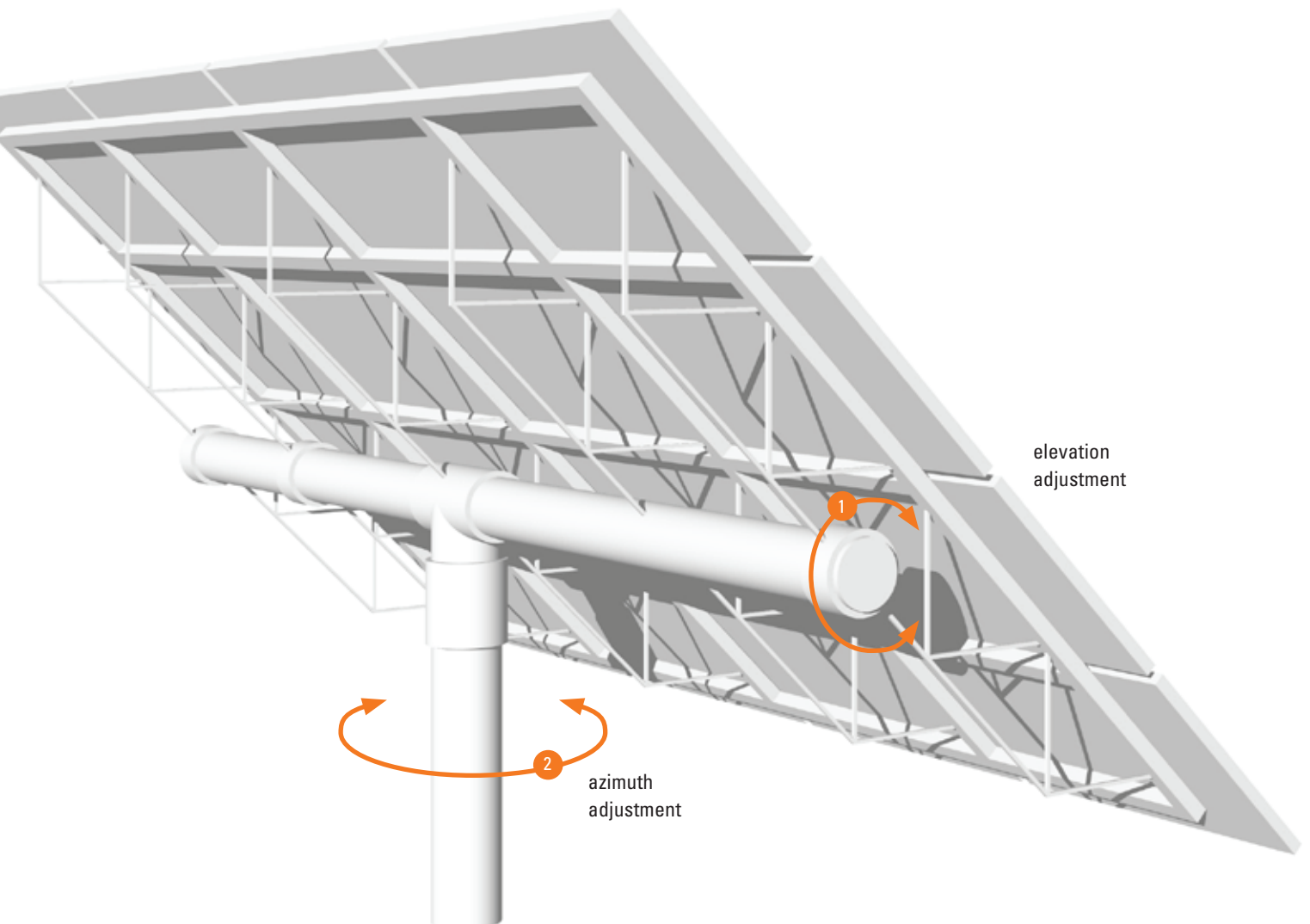
Elevation and azimuth position control of heliostats

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.



1 Sendix 5000 / 5020 incremental encoders

- 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

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.

The Z-Pulse (zero pulse) mechanical identification allows the reference position to be found immediately during the installation.



2 Sendix 585x / 587x absolute singleturn encoders

- Sturdy bearing Safety-Lock™ Design
- Accurate optical scanning, insensitive to magnetic fields
- Up to 17 bits singleturn and 12 bits multiturn resolution
- Many standard interfaces, others on request
- IP67 and operating temperature range from -40°C to +85°C
- Simple diagnostics

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. Easy handling thanks to external SET button and diagnostic LED. The wide number of interfaces available allows installation with any PLC type.

i 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.

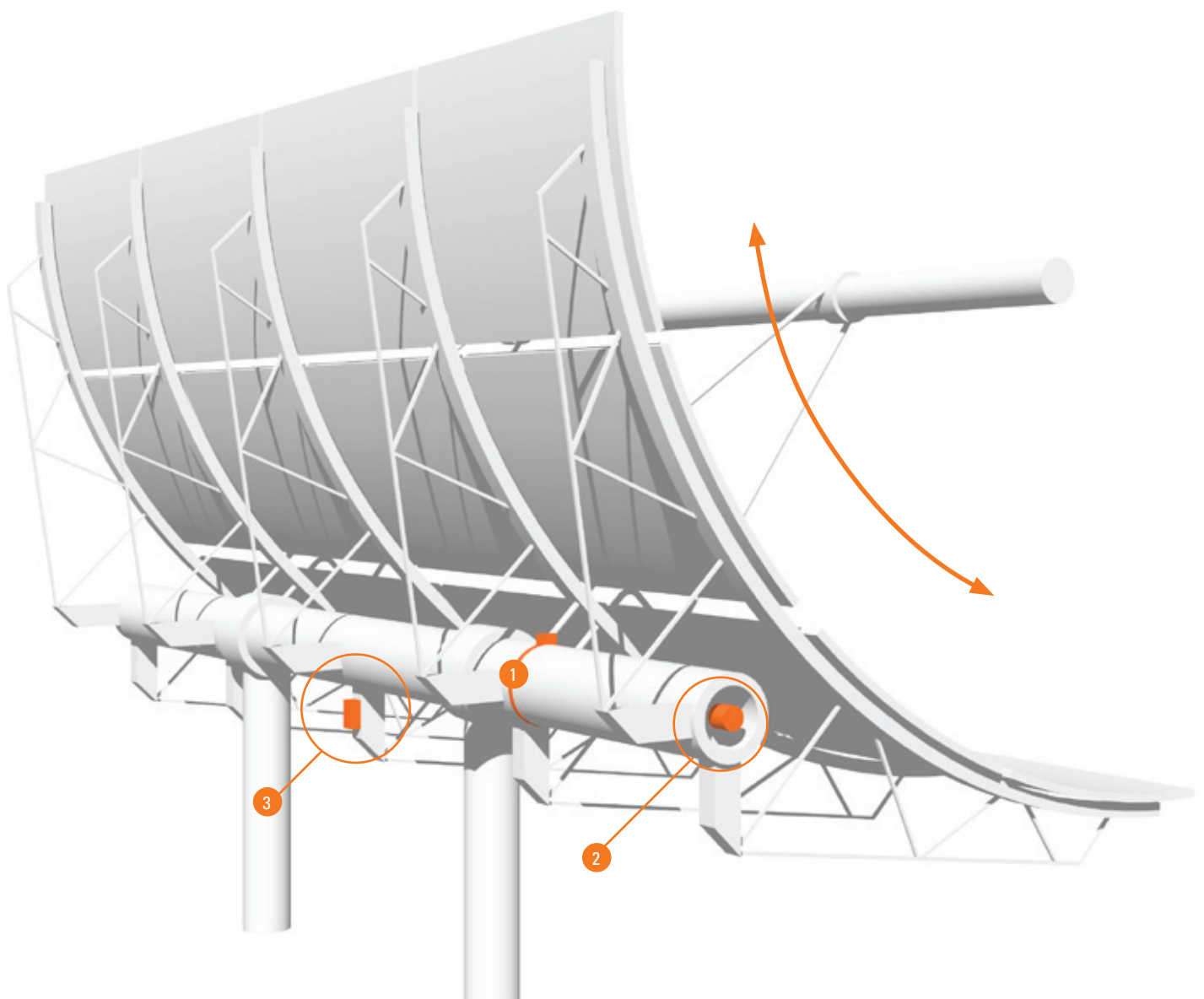


Angular position control of parabolic trough systems

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 customized 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.



1 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 EN60068-3-38, and damp heat test as per EN60068-3-78
- 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.

2 Sendix 36: magnetic singleturn 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 singleturn 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 implementation with different interfaces. Easy installation and troubleshooting with detection LED.

3 IS inclinometers

- Extremely compact and robust construction
- Measurement of 1 or 2 dimensions
- 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.



Customized motion and control systems

With our OPS department we offer complete control or motion solutions for your application. With our network of strategic partners we cover all aspects of the automation chain for solar applications.

We propose specific measuring systems, integrated drives, digital and analogue feedback systems up to complete motion systems.

Customer specific solutions

Complete system with motor, gears and controller from a single source specially designed for your application. Benefit from our wide experience in outdoor applications.

We offer you

- Intelligent bus-compatible drives systems
- Custom-designed compact drives
- Integration of the firmware into the application control



Gear

Servo motor

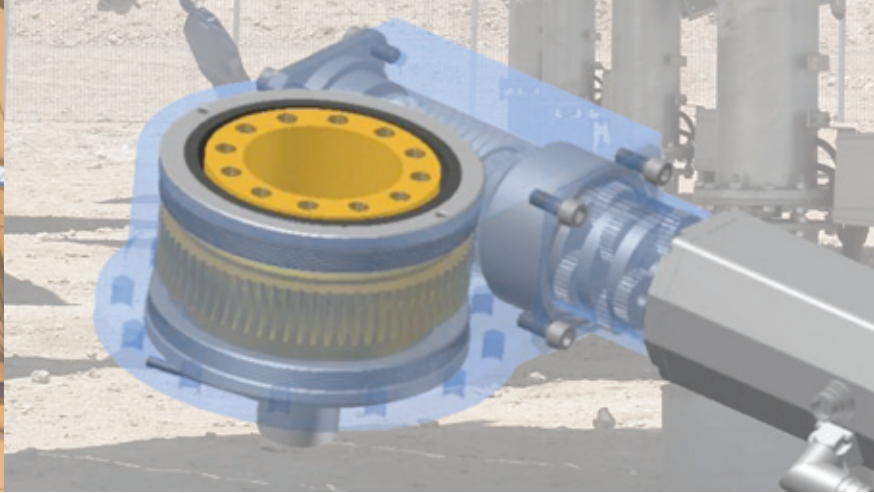
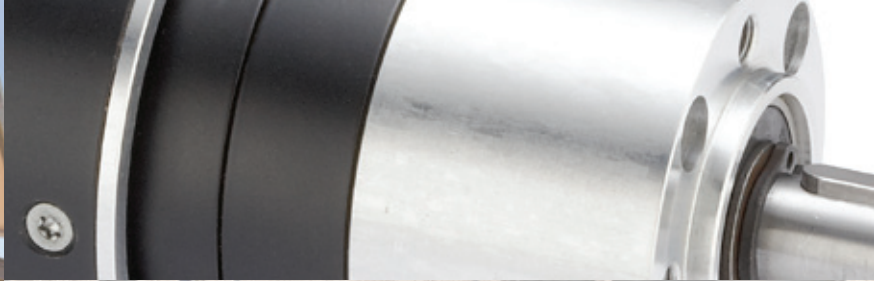
Fieldbus

Mains filter

Control with integrated
multiturn encoder

Examples of solutions

- Spindle-type linear actuators for elevation adjustment
- Integrated measuring system with high-precision drive for parabolic collectors
- Custom integrated for Fresnel power plants
- Compact drive with integrated fieldbus controller
- Custom position feedback systems with mechanical integration solution



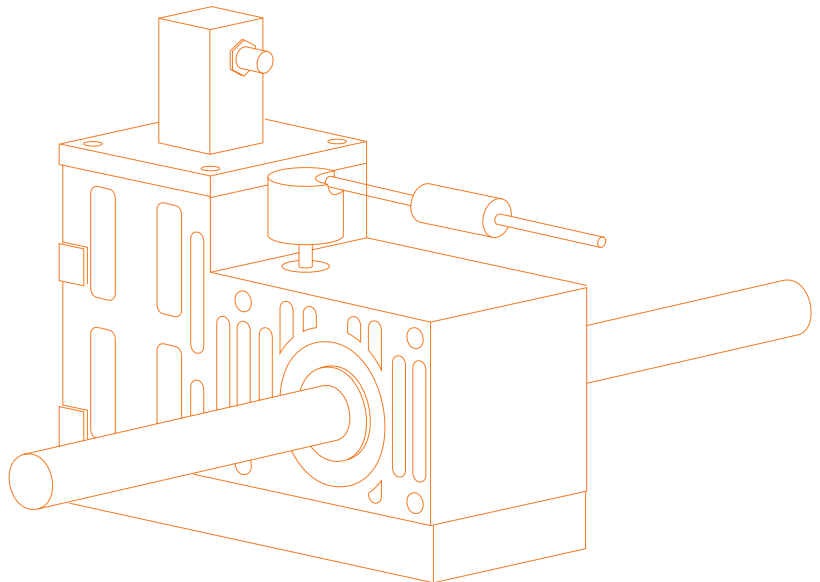
Kübler Design System

The Kübler Design System is a method approach to your solution.

Working together with your engineering team and ours, we will develop a customized solution with components designed solely for outdoor applications. We are your partner from the initial analysis of the requirement through to the final industrialisation.

Our services for your project

- Analysis / design
 - Understanding climatic conditions
 - Define required precision
 - Installation concept
 - 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



i Advantages of customized integrated motion solutions

- High liability 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 through high integration level of the system
- 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

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.



Safety-Lock™

The Sendix encoders offer higher reliability and longer service life, as well as 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.

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.

Sendix M36 – magnetic encoders

For outdoor use with humidity – absolute angle measurement with fieldbus control – robust encoder requiring little space

- 36 mm size
- CANopen interface
- Magnetic scanning
- Safety-Lock plus™ with IP69k
- Status display

Sturdy 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 outdoor use without any problem.

The die-cast housing has a very strong base, onto which the connector flange is fastened with four screws.

The Sensor-Protect™ design of the M36 encoders allows, thanks to fully encapsulated 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 high-pressure cleaning.



Safety-Lock™



High shaft load capacity



Shock / vibration resistant



Seawater-resistant version on request



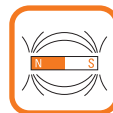
High protection level



Temperature



Magnetic field proof



Magnetic sensor technology



Optical sensor

Limes – magnetic system for outdoor use

The Limes measuring system with bands or rings is a non-contact system designed especially for outdoor use and for very high reliability in the field.

Measuring heads have a particularly solid aluminium housing with a stainless steel cover, which achieves the protection levels IP69k, IP68 and IP67. A wide temperature range, plus UV-resistant cables that ensure outstanding resistance to condensation, give to the system highest reliability in CSP applications.

The very compact system can be accommodated in the smallest installation spaces. Setup of the system is particularly easy as the tolerance for distance and misalignment between band and measuring head is up to 1 mm. A built-in diagnostic LED indicates the index pulse or gives a warning if the tolerances are exceeded. Rings and bands can be customized within a wide spectrum of different geometries to have an optimal fit for the application.

Shock and vibration resistant

Kübler encoders avoid serious, expensive failures right from the start – even with increased levels of axial loading, shock and vibration.

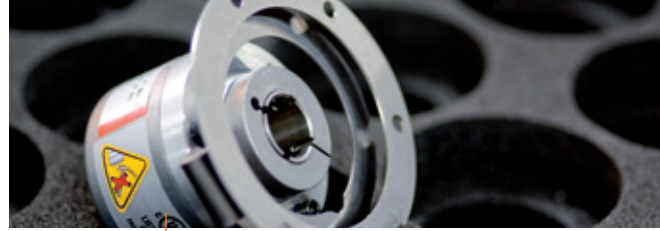
This can eliminate enormous service costs and expensive downtimes in plants and installations worldwide. The high IP protection level makes these devices less sensitive to wet conditions outdoors, and for temperatures between -40°C and +90°C or for altitudes over 3000 meters above sea-level.

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.





Presales

Kübler – the service specialists for every industrial sector and application – supplying complete integrated solutions – globally on your doorstep

Sample Service – Fast delivery of customised versions

Selection tool
Kübler website: Product Finder

Delivery Service: 10 by 10,
48 h Express and Repair Service



Kübler Service for planning dependability

Fast, reliable service and professional advice have top priority at Kübler. We are globally on your doorstep in 6 service and application centres and offer our customers planning dependability.

We deliver from stock within one day. We can manufacture your special orders within 48 hours. Moreover, 10 by 10 is our delivery offensive, which ensures that – for quantities of up to 10 pieces – you will receive all catalogue products so marked within 10 days. Our processes and services are certified and are constantly being improved.

10 by 10

With our 10 by 10 Service we will manufacture 10 encoders within 10 working days.

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



Technical Hotline

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



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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.



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.



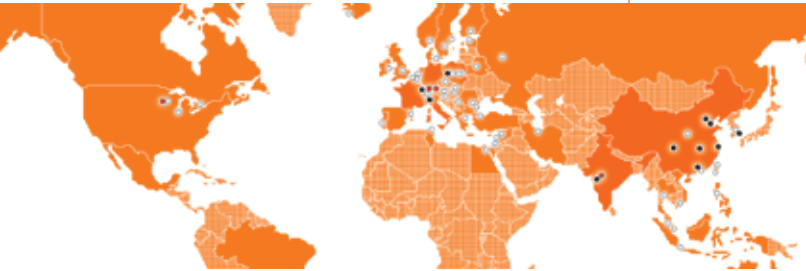


Service Excellence provided by Kübler application specialists for target sectors

Product security – replacement models at the end of the product life-cycle

Aftersales

Service Centres, globally on your doorstep:
Advice, analysis, support during installation in over 50 countries



« 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. »

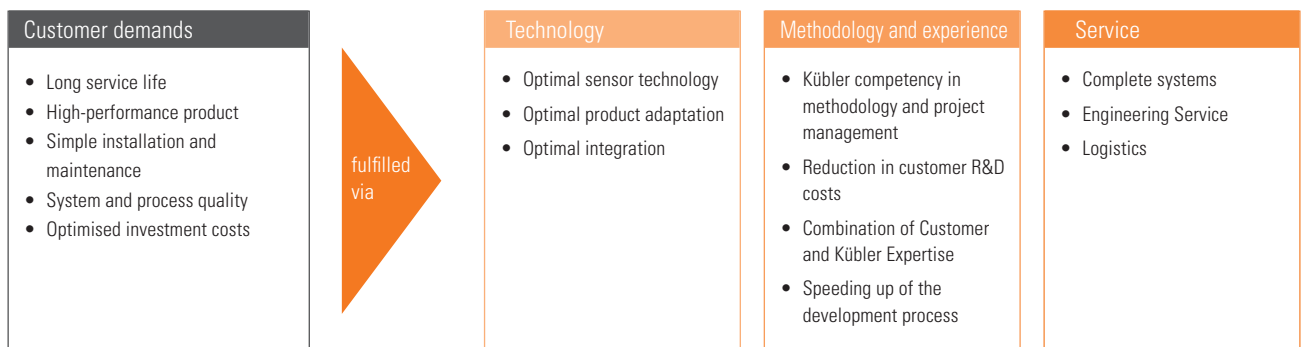
Purchasing Manager, German Producer of Geared Motors

Tailor-made solutions – Kübler Design System

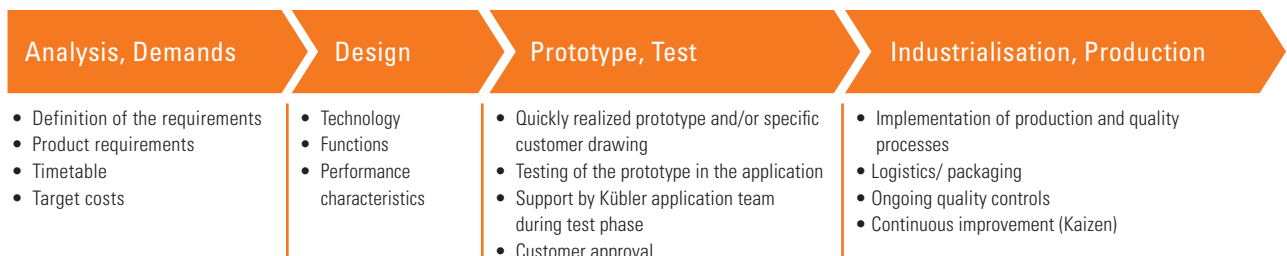
« With the KDS method our customers receive a lasting solution to lowering costs, reducing the number of models available or eliminating quality deficiencies. With KDS we develop product and engineering solutions together. The method stands out because of its structured process; this delivers innovation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

Gebhard and Lothar Kübler, Managing Directors Kübler GmbH

The Kübler Design System – satisfying customer demands



The 4 phases of the Kübler Design System



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
- Connection Technology
- Accessories

Order-No. German **R.100.568**

Order-No. English **R.100.569**



Counting and Process Devices

- Pulse Counters and Preset Counters
- Timers and Preset Hour Meters
- Frequency Meters and Tachometers
- Combination Time and Energy Meters
- Position Displays
- Process Displays and Controllers
- Temperature Displays and Controllers

Order-No. German **R.100.156**

Order-No. English **R.100.157**



Connector and Signal Transmission Technology

- Slip Rings
- Optical Fibre Signal Transmission Modules
- Cables, Connectors and Cordsets

Order-No. German **R.600.948**

Order-No. English **R.600.948.001**





Solar Energy

www.kuebler.com



www.kuebler.com/solarenergy

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