

Solutions for Wind Turbines

- Absolute Encoders
- Incremental Encoders
- Hour Meters
- Transmission Technology



Kübler Pulses for the Wind Industry. Safe and Reliable.

Wind turbines are constantly in use everywhere. Encoders that are used for pitch and azimuth positioning or for speed measurement in wind turbines are consequently exposed to a harsh working environment. The deciding factor is the permanent availability of the signals – since downtimes or replacements are not only expensive but also time-consuming.

Kübler encoders, counters and transmission technology measure up to these expectations. At the same time many helpful details provide the required security and offer a high level of convenience.





Kübler Encoders

Positioning and measuring speeds with a high level of safety and reliability

- Absolute encoders P. 4
- Incremental encoders P. 6



Kübler Transmission Technology

The solution for safe signal transmission

- Optical fibre modules P. 10
- Cables, connectors P. 10
- Cordsets P. 10



Kübler Counting Technology

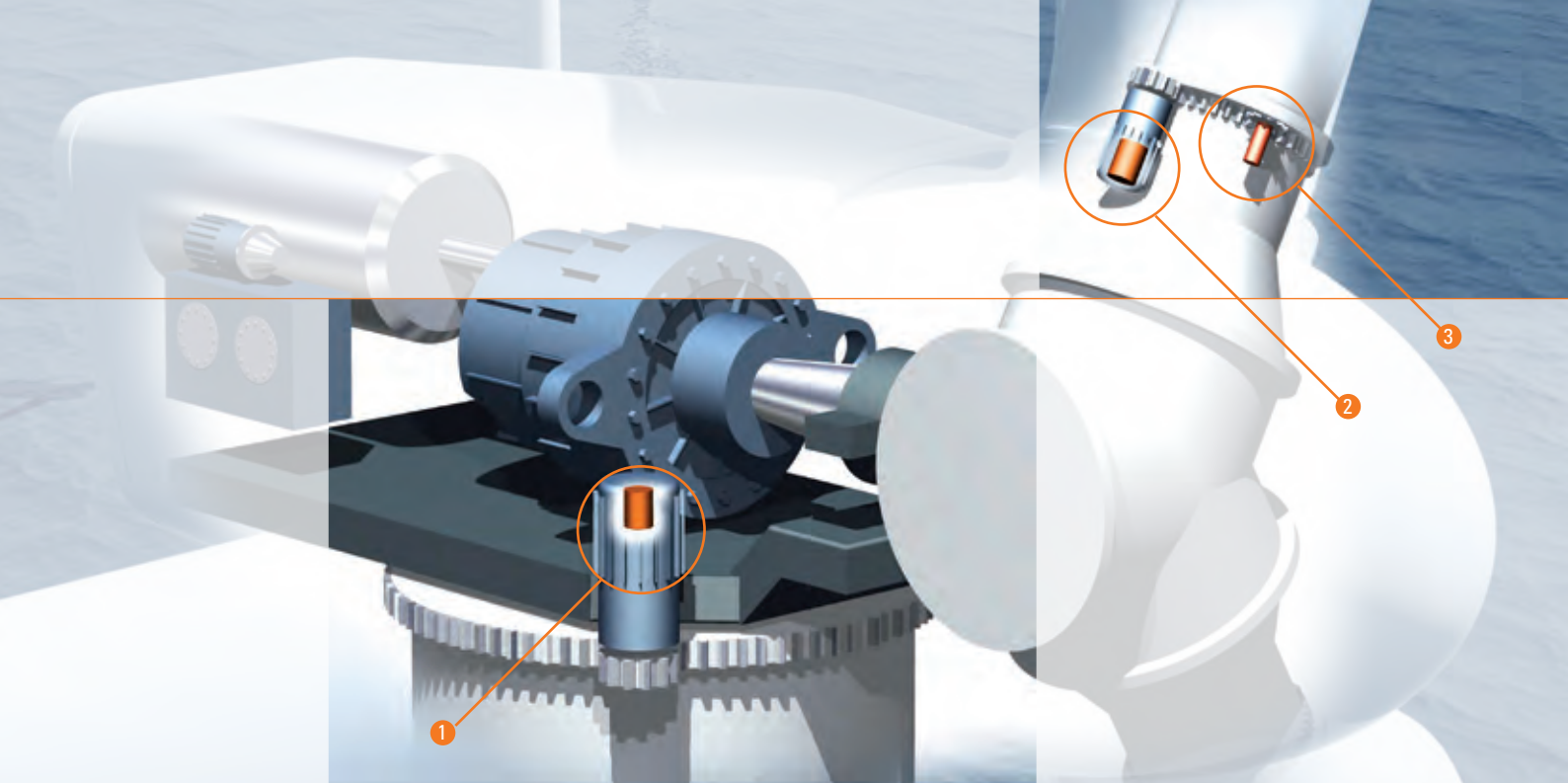
Precise monitoring of hours run and speed

- Hour meters P. 11

Kübler GmbH develops, manufactures and markets leading-edge position and motion sensors, counters and transmission technology.

Founded in the year 1960, the family business is now led by the next generation, Gebhard and Lothar Kübler, and the export share of its turnover exceeds 60 percent. 6 subsidiaries and 50 exclusive representatives offer local product know-how, service and advice throughout the world.





Pitch and Azimuth Control

Safety first! Measuring systems form an integral part of the safe control of pitch and azimuth and need to offer reliable, precise availability at all times. No matter when nor where. Kübler Sendix series encoders set standards here when it comes to safety, accuracy and ruggedness – whether in the drive or as a stand-alone measuring system in wind turbines.

The flexible options offered by the Kübler Sendix encoders create the ideal solution for every eventuality when it comes to the construction of wind turbines.

1 Absolute Multiturn Encoders Sendix 58

Whether integrated into the drive, or as stand-alone systems, Sendix absolute encoders in the standard 58 mm size are tried and tested, rugged as well as high-precision measuring systems for pitch and azimuth angles.

- Highly accurate optical scanning
- 100 % insensitive to magnetic fields
- No battery required to save the number of turns
- Up to 17 bits singleturn and 12 bits multiturn resolution
- Interfaces: SSI, CANopen, BiSS and many more
- With additional incremental outputs RS422 and Sin/Cos
- Working temperature range -40°C up to +90°C with IP 67 protection level
- Sturdy bearing construction in Safety Lock™ Design
- Simple diagnostics

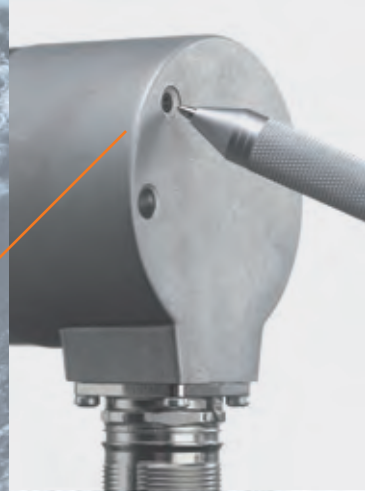
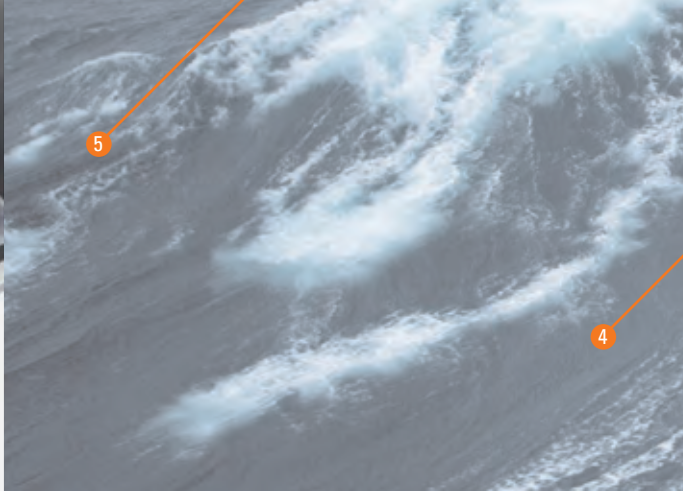
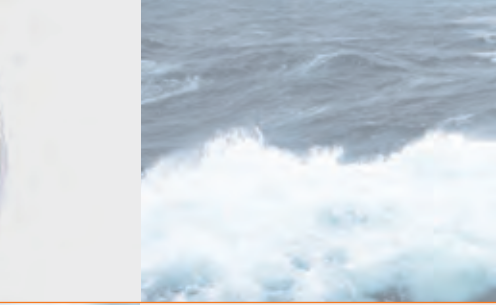


2 Absolute Encoders with integrated Resolver

Safety and redundancy: Sendix encoder and resolver combined within one housing.

- Two in one advantage: encoder and resolver in one element
- For a safe emergency shutdown of the wind turbine
- The encoder supplies accurate position data of the pitch-angle of the blade to the pitch controller
- The resolver supplies real-time signals to the frequency inverter
- Options: with reset key and seawater-resistant





3 Encoder with rugged bearing unit

The complete mounting assembly facilitates installation and guarantees safe, reliable operation. Flexible interfaces and technologies ensure optimal adaptation to every application.

- Complete system for direct installation onto the pitch or azimuth gear rim.
- Set comprises: rugged bearing unit, mounting bracket and pinion.

4 Reset Button

Small details make installation and servicing simpler: as an option, reset buttons can be integrated into the covers of the Sendix absolute encoders.

- Reset button and status LED for easy setting of the rotor blade reference, also during installation or servicing
- Resetting either via button or interface

5 Optical multiturn gear

The extremely compact optical gear counts revolutions safely and reliably – without a battery.

- 100 percent resistant to magnetic fields, even with strong fields as are found surrounding the magnetic brakes of the pitch drive

Sendix F36

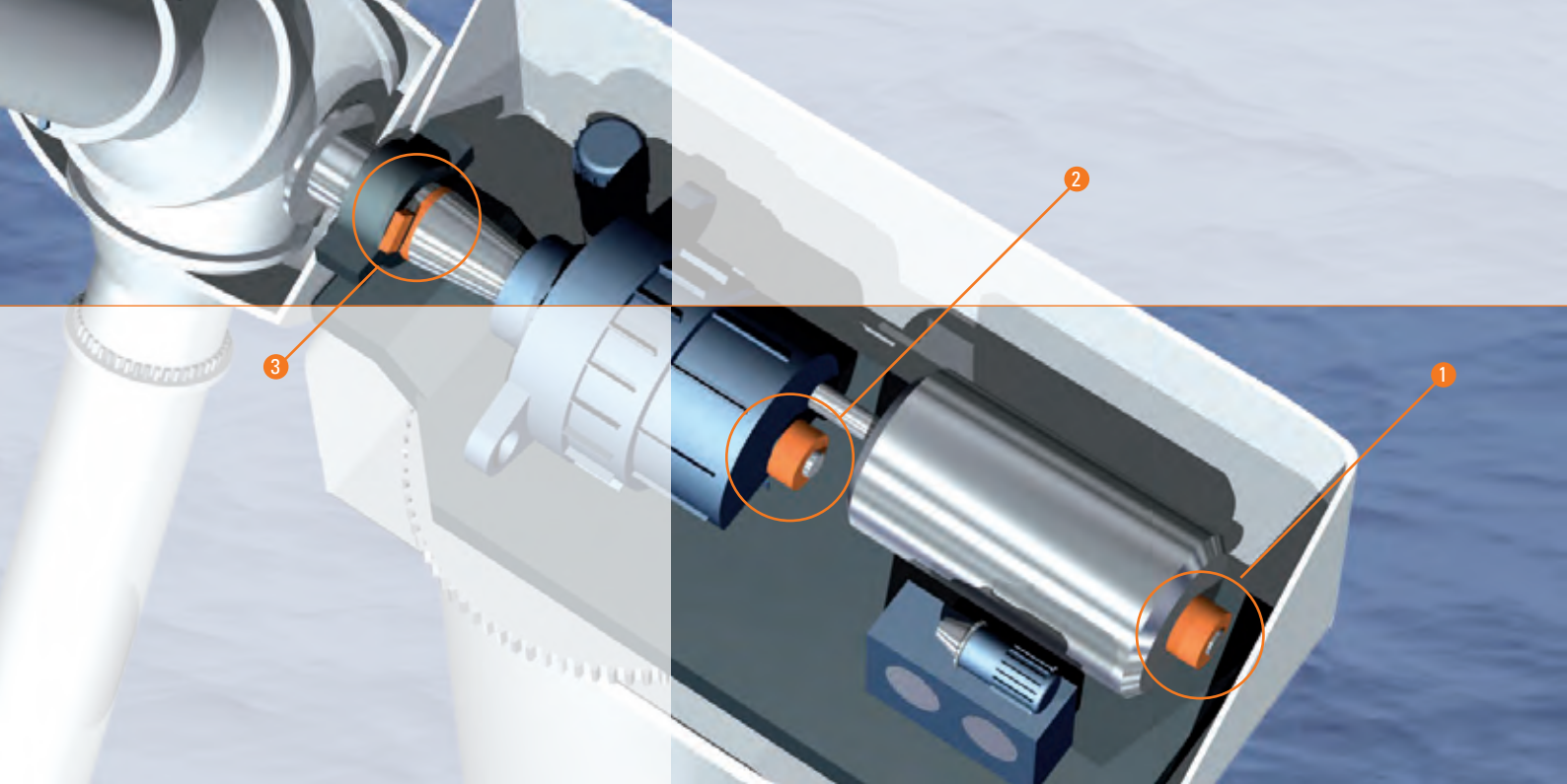
The Sendix F36 is a highly accurate, optical encoder without gears, which at the same time is 100% resistant to magnetic fields. Even when installation space is very limited, it is ideal for integration into components, such as in geared limit switches or drives.

- Highly integrated singleturn / multiturn scanning in a single ASIC
- 17 bits singleturn + 24 bits multiturn = 41 bits total resolution
- Interfaces: SSI, CANopen, BiSS, additional incremental outputs RS422 and Sin/Cos
- -40°C up to +90°C with IP 67 protection level
- Sturdy bearing construction in Safety Lock™ Design

Sendix M36

Ideally suited for use in extreme applications, due to a totally enclosed housing, encapsulated electronics and sturdy bearing unit.

- Robust magnetic scanning
- High shock- (> 500 g) and vibration resistance (> 30 g)
- Resistant to humidity and condensation
- -40°C up to +85°C with IP 69K protection level
- Interfaces: analogue 4 to 20 mA, 0 to 10 V, SSI, CANopen
- LED fault indication



Speed measurement of rotor and generator shafts

A tough nut. Accurate speed information is an important measurement for the control loop of a wind turbine. Measuring systems that supply this information are often subjected to harsh environmental conditions but must not suffer any loss of reliability.

Kübler incremental encoders can handle strong vibration or extreme variations in temperature without any problem. Here, their diverse fitting options guarantee easy, safe installation.

1 A02H Heavy Duty

The Heavy Duty encoder A02H guarantees the exact rotational speed on the generator B-side.

- An alternative to classic Heavy Duty encoders, which are often over-engineered and expensive
- Plastic isolating inserts protect against shaft currents and prevent damage to the bearings
- RS 422, push-pull or Sin/Cos outputs
- Balanced stainless-steel clamping ring
- -40°C up to +80°C, IP65
- Simple, accurate mounting, axial screw-fitting for taper and cylindrical shafts

2 Sendix 5000/5020

Multitalented device for all types of application, with suitable connector options for every eventuality.

- Compact housing
- Comprehensive range of matching accessories and fixing options
- Increased resistance, due to rugged die-cast housing
- Sturdy bearing construction in Safety-Lock™ Design
- -40°C up to +85°C, IP 67
- Flexible, with versions suitable for every application: cable connection, M23 or M12 connector
- Optional: sea-water resistant





High-resolution Analogue Encoders

For precise measurement of the low speed of the rotor. When using the version with Sin/Cos outputs, the interpolation factor in the controller can be selected as desired. This enables a very high angular resolution to be achieved for one turn of the rotor.

- Flexible incremental encoders in 58 mm diameter format as industry standard
- High resolution: up to 36,000 pulses with output signals as RS422 or push-pull
- Sin/Cos versions

High-temperature Encoders

High-temperature encoders are suitable for ambient temperatures up to 105°C.

- For use in the slip-ring housings of wind turbines
- With connectors or heavy-duty PUR- or TPE cables

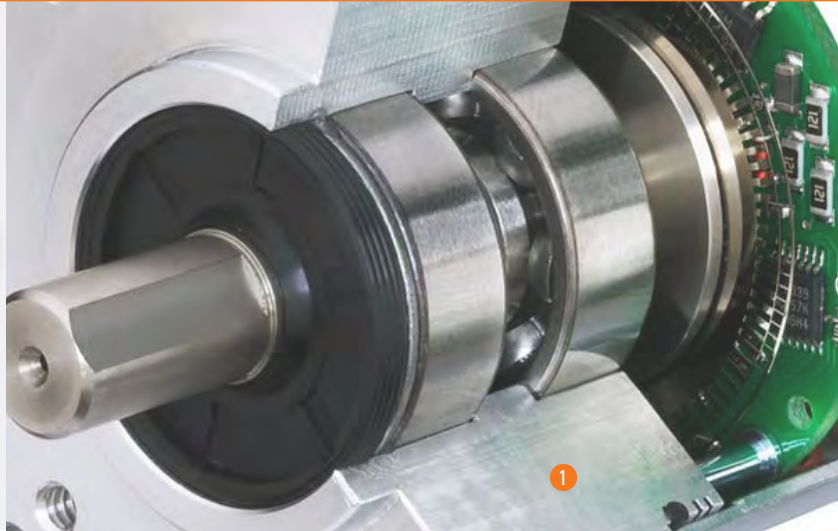
Magnetic measuring systems

The Limes LI20/LI50 bearing-free compact systems open up possibilities, where encoders have reached their limits.

- For extreme shock and vibration loadings
 - shock up to 500 g / 1 ms
 - vibration up to 30 g / 10 ... 2000 Hz
- With magnetic rings RI20: shaft diameter up to 30 mm
- With magnetic bands B1/B2: for measuring large diameters, ideal for rotary speed measurement on the rotor shaft of wind turbines.

Kübler Sendix

The Sendix family of devices guarantees an extremely safe and fast technology in an exceptionally compact housing. Among its trademarks is the sturdy Safety-Look™ Design bearing structure and a compact rugged housing technology that facilitates problemfree use outdoors, as well as a wide variety of connection and mounting options. Optimised encoders can be created within the modular system. Following the motto: the use determines the product.



Technologies for the Wind Industry

Innovations from Tradition. 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 wind turbines.

Small details make a big difference. Our products feature many intelligent, high-quality extras, which offer our customers important advantages, whilst at the same time making a significant contribution to the high availability of the wind turbine.

1 Safety Lock™

The reliable Sendix encoders, with their long 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.



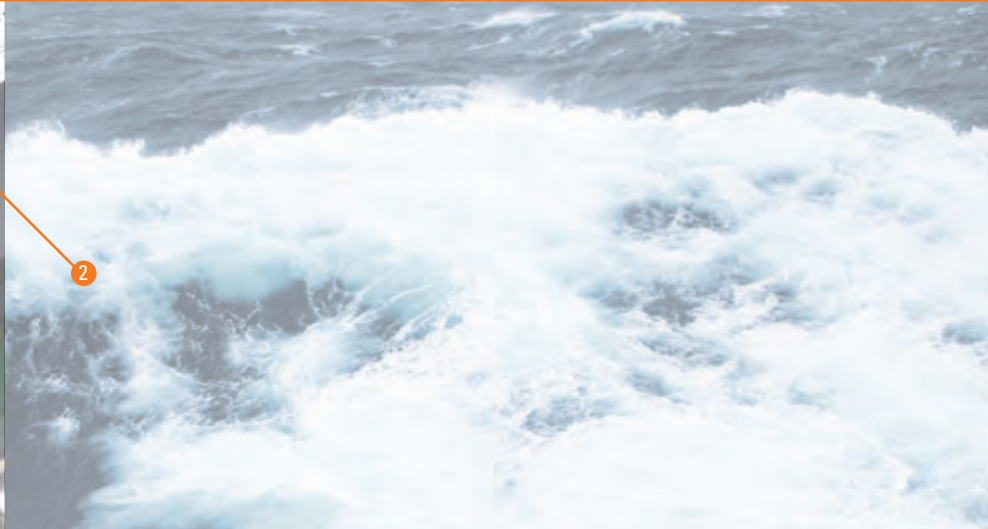
2 Optical sensor systems without a battery

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 single- or multiturn devices.

The technology dispenses with any components that may be susceptible to magnetic influences.

As a result of the proven drive, the encoder has no need of a battery to store the number of revolutions.





Tested
acc. to the salt-
spray test
IEC 68-2-11
=> 672 h

Sea-water resistant versions

Although it has already proved itself in harsh environments, the Sendix family of devices has now been tested and certified to IEC 68-2-11 for resistance to the effects of salt-spray over a period of up to 672 hours – the highest test level.

The high certification level for the Sendix encoders attests a high level of corrosion resistance.

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 applications worldwide. The high IP 67 protection level leaves the devices unimpressed by wet conditions outdoors, by temperatures between -40°C and +90°C or by 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 that, on the one hand, the reliability in the application can be increased significantly, and on the other hand the technology demonstrates quality EMC characteristics and shock resistance.

Availability with SIL3 certification

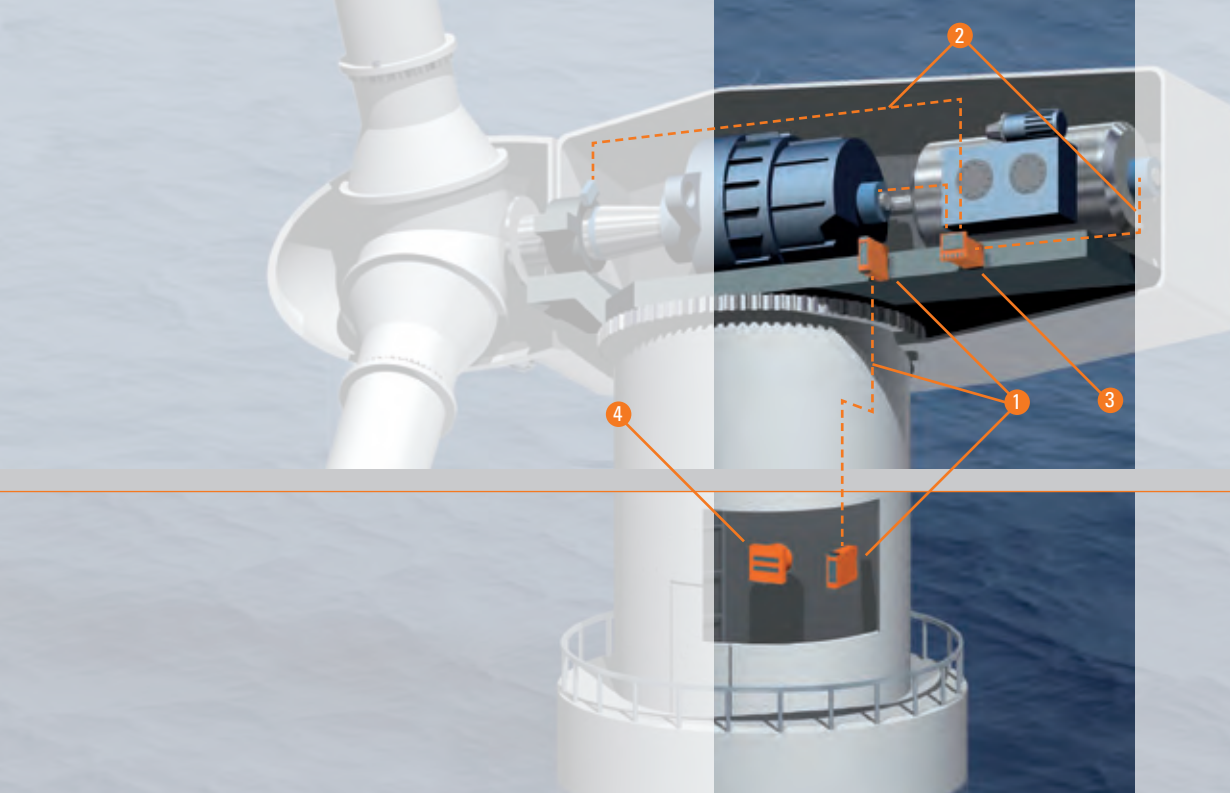
Safety is – not least since the new EU Machinery Directive – an “integral part of (Wind)-turbine construction”.

Sendix SSI absolute encoders with additional incremental Sin/Cos output and Sin/Cos versions of incremental encoders are available SIL3 certified.

But safety goes further than this: safer components are characterised by a robust, reliable interface and by the ability to cope with high mechanical and electronic loads.

On the basis of their design that has been optimised with respect to safety, Sendix encoders make an important contribution to increasing the availability of wind turbines.

www.kuebler.com/safety



Transmission and Counting Technology

Well advised. A perfect match for Kübler encoders and counters, the comprehensive range of transmission technology, cables, connectors and cordsets ensure compatible, error-free connections and highly-accurate transmissions.

Doubly safe. Counting technology components from Kübler reliably monitor control functions.

As a redundant component they can activate up to 6 alarm outputs in case of overspeed or underspeed.

Slip or gear breakage can be effectively avoided by comparing two speeds with each other.

1 Optical Fibre Transmitters, Receivers and Cable

Optical fibre modules safely transmit encoder signals. Even over long distances.

- The optical fibre does not suffer from mains-induced interference, caused for example by generators or frequency inverters
- Available for incremental and SSI signals

2 Connectors and Cables

A comprehensive range of cables, connectors and cordsets ensure error-free connections and reliable transmission.

A perfect match for the encoders and counters, it includes:

- M12 connection technology: cordsets – straight, angled and with LED indicator in the connector
- SSI, Profibus, CANopen and DeviceNet
- M23x, MIL and valve connectors
- Connectors for self-assembly
- Cordsets





3 Position and Difference Preset Counter 572

- 2 separate freely scalable count inputs HTL or TTL; Both also with inverted inputs; max. input frequency 1 MHz/channel
- Very bright LED display, 15 mm high (6 digit) and 10 mm high (8 digit)
- 4 freely programmable fast solid-state outputs, each with 350 mA output current
- With 8 different permanent count functions, such as simple count, difference count and total count of both inputs, batch counters etc.

3 Universal Preset Counters Codix 923 and 924

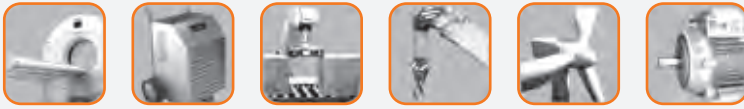
- Multifunction: Counter, Timer and Tachometer in one device
- Up to 6 presets with relay or optocoupler outputs
- User-friendly: simultaneous display of the actual value and the presets, batch count or total count
- Direct entry into the programming
- With accessories for DIN-rail mounting in the control cabinet

4 Timer and Counter HC 77

- The HC 77 monitors the hours run and turn-on cycles of the wind turbine.
- Electromechanical counter retains the values if power is lost
- Combination of hour meter and totalising counter
- High shock resistance
- Magnified figures
- UL-approval

Kübler Codix

The Kübler Codix brand name stands for universal usability and standardised manufactured sizes, as well as the philosophy of easy, menu-driven programming of the latest generation of counters. Centre stage is taken by the large, easy-to-read LED or LCD displays and the intuitive – frequently, menu-driven – programming. The high-quality plug-in screw terminals make a significant contribution to fast, simple start-up.



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 most of our current products within 10 working 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.



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.



Technical Hotline

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

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Kübler Italy	+39 0 26 42 33 45
Kübler China	+86 10 5134 8680
Kübler India	+91 9819 457 872
Kübler Poland	+48 6 18 49 99 02



24 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 24 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



Taylor-made solutions

We answer the varied, individual requirements of our customers with a comprehensive spectrum of product solutions and services.

The Kübler Remote Design Desk

Together with you, we will analyse your exact requirements—based on CAD designs.

We will generate suitable solutions – on the basis of our tested, certified products and systems.

Kübler OEM Products and Systems

Kübler integrates components and offers complete systems for display, measurement and control tasks, all from one source.

Product and system solutions, from prototyping to high-volume production, are designed in close cooperation with our customers.

Here we use our standard encoders, counters and process meters, in addition to well-engineered system components from our network of highly-skilled partners.

Product information

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

Sensor Technology

- Encoders
- Draw wire encoders
- Magnetic measurement systems
- Inclinometers
- Slip rings
- Connection technology
- Accessories



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

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

Counting and Process Technology

- Pulse Counters
- Preset Counters
- Timers / Hour Meters
- Tachometers / Frequency Meters
- Position Displays
- Multifunction Counters
- Energy Counters
- Process and Temperature Displays
- Accessories



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

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

Transmission Technology

- Slip rings
- Fibre Optic Modules



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

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

www.kuebler.com/windenergy

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