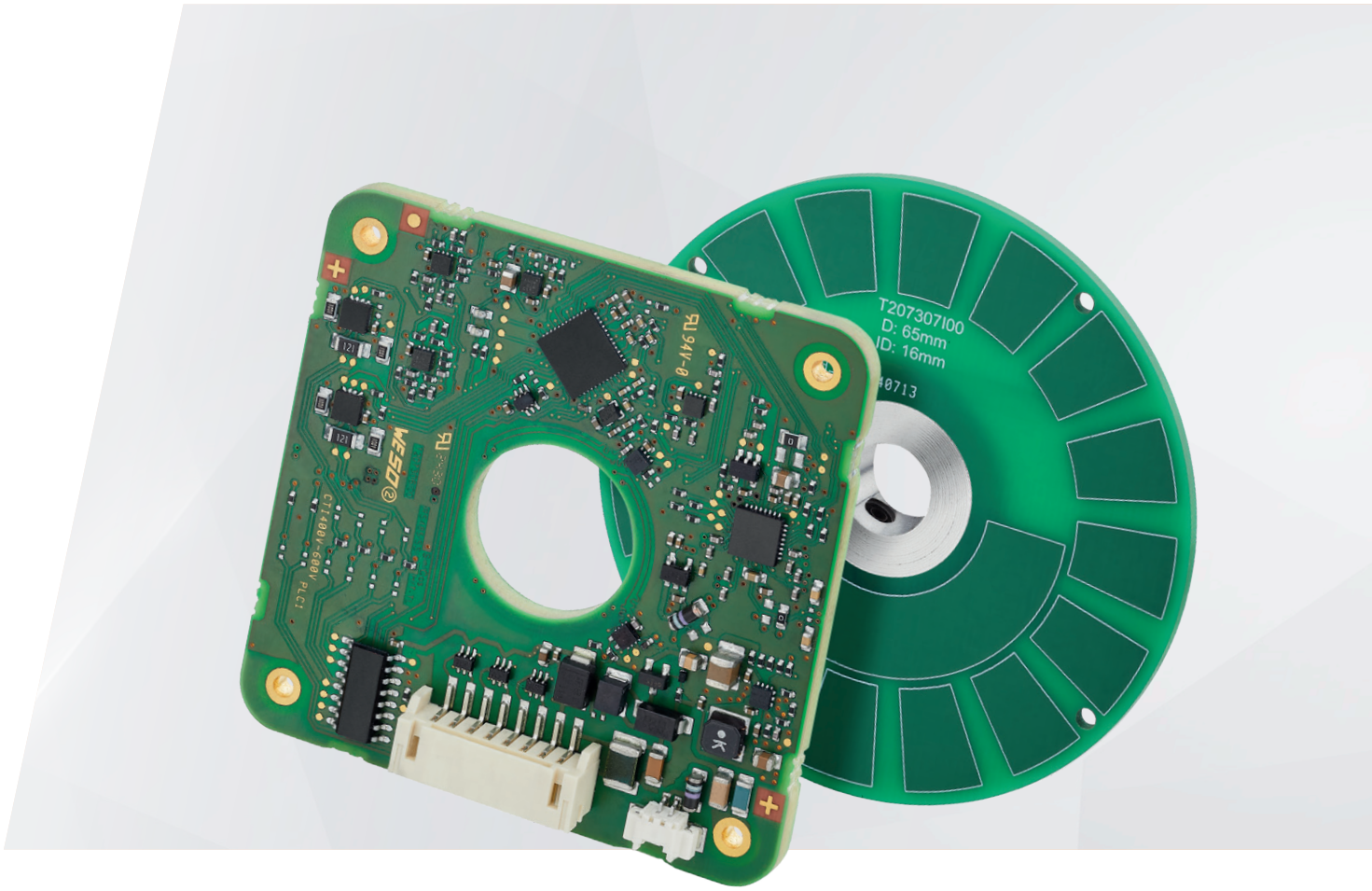


INTEGRATED ENCODER SOLUTIONS

Inductive sensors, magnetic sensors
with diametrical magnets or magnetic rings

pulses for automation

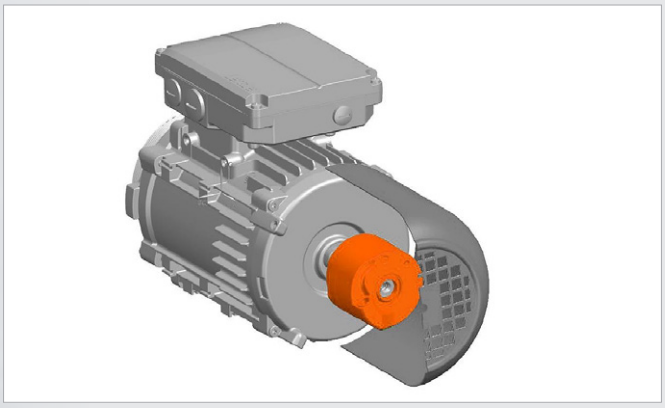
Integrated encoder solutions

The trend in drive technology is increasingly moving towards more compact, more efficient systems. The aim is to minimize not only installation space, but also installation and maintenance costs.
Kübler's bearingless encoder solutions for direct integration into drives go one step further. All installation solutions can be individually adapted to the respective application – ideal as part of a joint development of your drive systems with us in the "Kübler Technology talks."

- For extremely compact drive concepts
- Wear- and maintenance-free thanks to bearingless technologies
- Less effort required for installation and connection of sensors
- Reduced overall costs

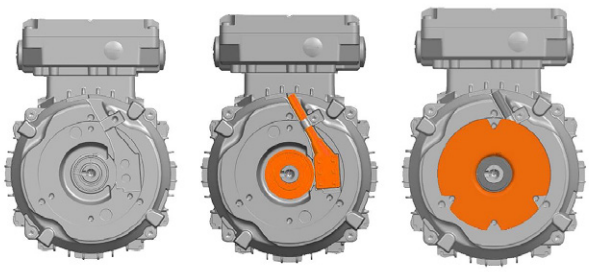
Kübler Technology Talks

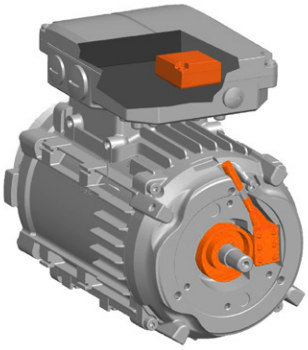
Disruptive solutions
In joint workshops, we consciously break new ground – moving away from traditional specifications and requirements toward a holistic view of the system. This approach takes into account not only the technical requirements, but also the conditions in the field and along the entire value chain.



Holistic approach
Kübler accompanies the entire product development process- from the initial idea through development and testing to industrialization and packaging. This is how a vision is transformed into a market-ready, perfectly integrated complete system.

The optimal result
The sensor technology provided by Kübler is fully adapted to the jointly developed concept. Depending on requirements, this results in a modular system that can flexibly map different drive variants.

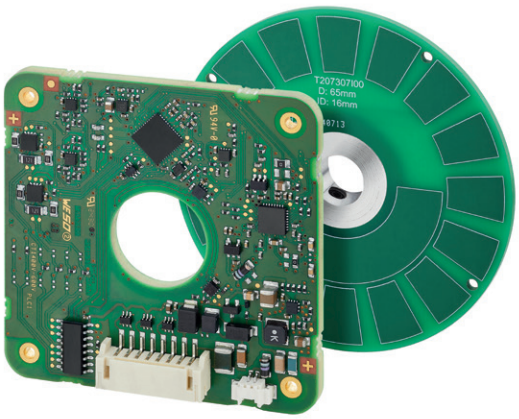




Inductive sensor technology

Incremental and absolute position and speed detection

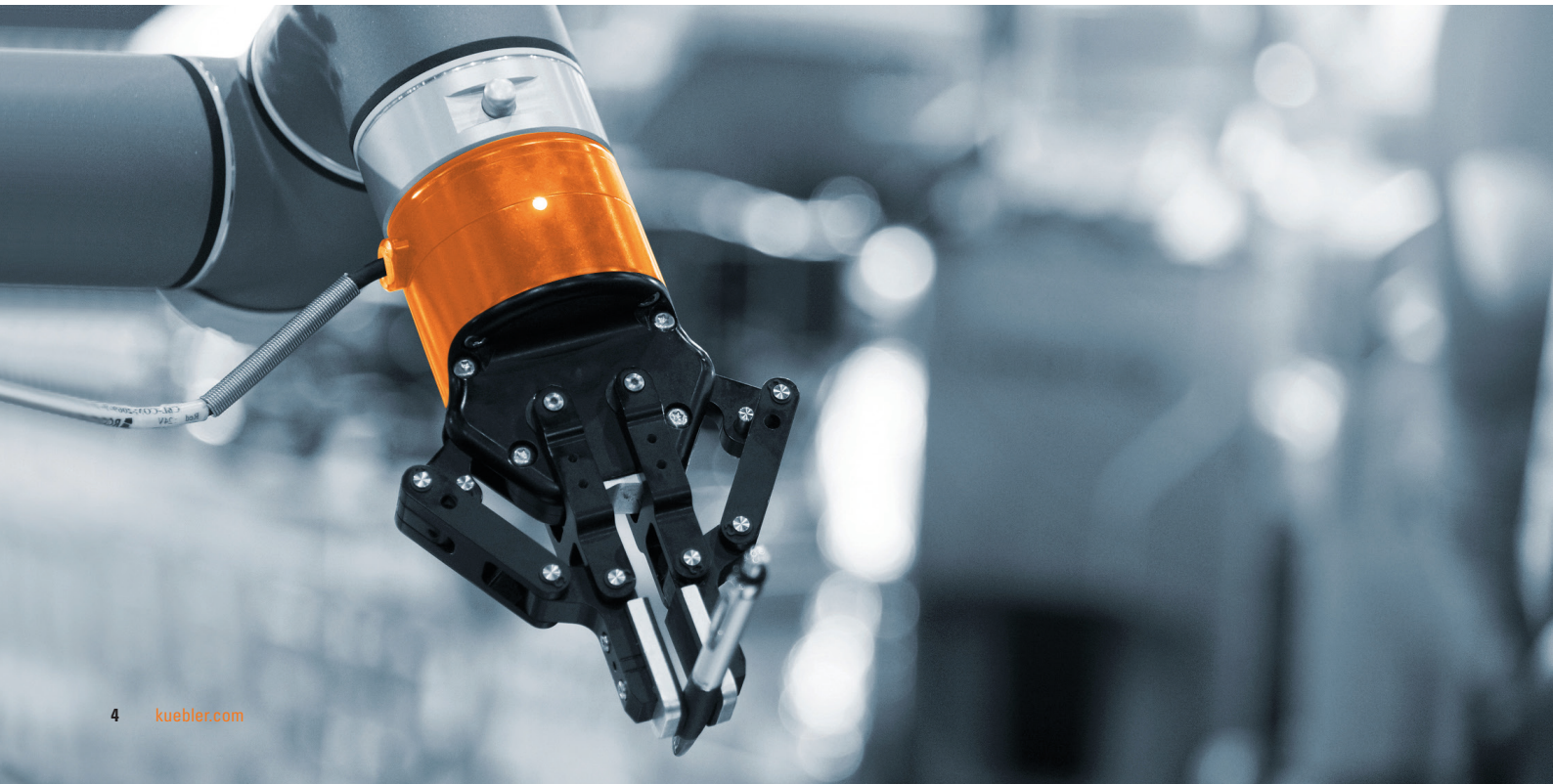
Inductive encoders from Kübler precisely measure angular positions and rotational movements based on the inductive measuring principle. Unlike optical systems, they offer particularly high resistance to dust, oil, vibrations, and moisture- ideal for industrial use.



- Resistant to external influences
- Flexibly adaptable to individual geometries and space requirements
- Large mounting tolerances in radial and axial directions
- Extremely compact design consisting of only two circuit boards

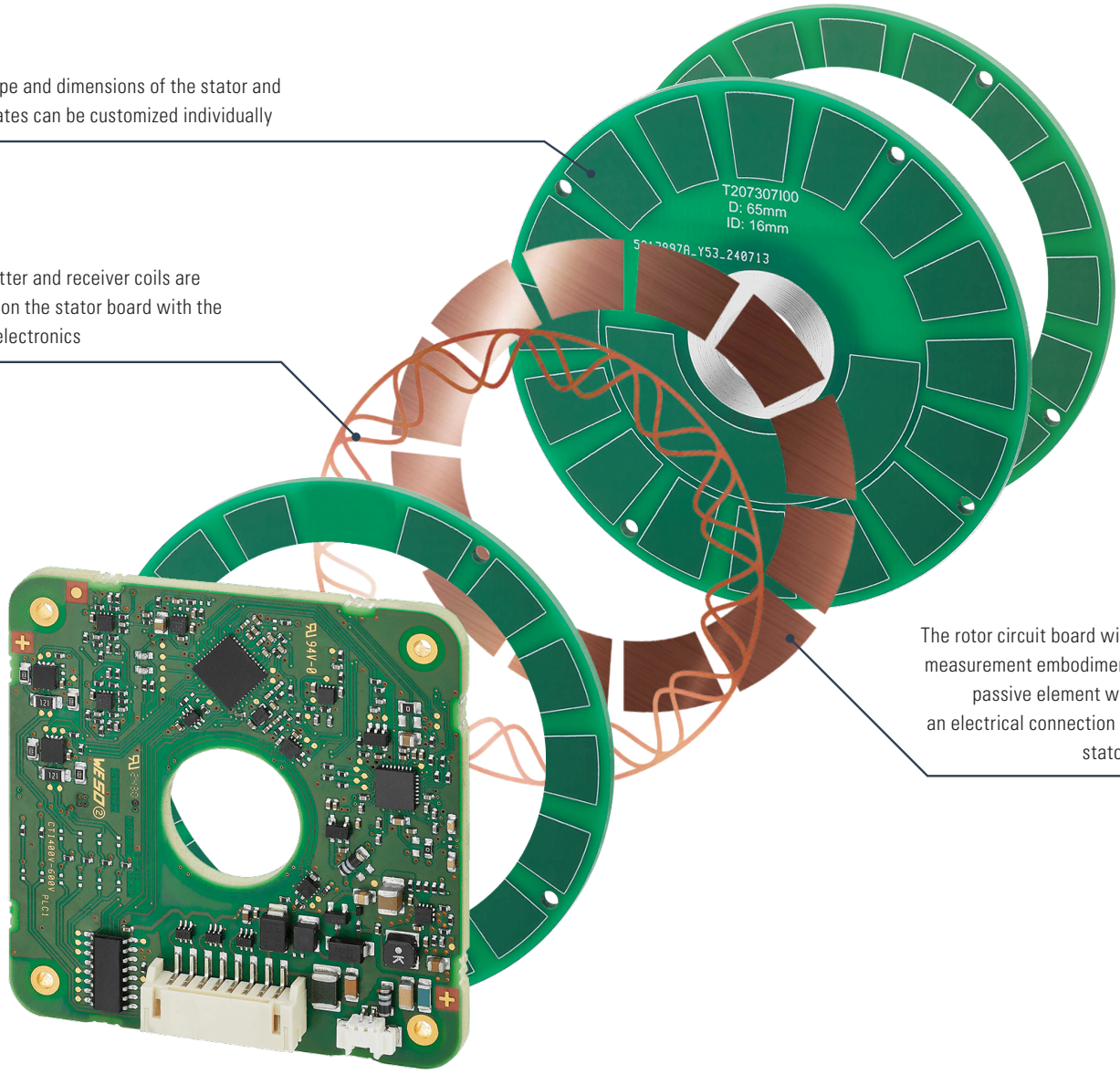
Versions

Absolute, singleturn	Provides unique position information for each angle position. The position is retained even after a power loss.	Incremental	Generates pulses with every movement. The exact position is determined by counting the pulses; a reference run may be necessary.
Absolute, multiturn	Provides accurate position information over multiple revolutions – ideal for complex motion profiles.	Combination	Kübler inductive encoders can combine and output position information from both incremental and absolute measurements.



The shape and dimensions of the stator and rotor plates can be customized individually

Transmitter and receiver coils are located on the stator board with the sensor electronics

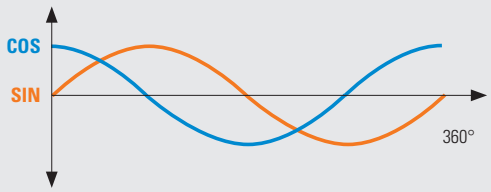


The rotor circuit board with the measurement embodiment is a passive element without an electrical connection to the stator side

Functionality

Inductive encoders operate with a high-frequency signal that is influenced by the rotational movement of the rotor. The strength and phase of this signal change depending on the rotor position. Receiving coils on the stator side continuously detect these changes over the entire circumference. This allows the exact angular position of the rotor to be determined precisely and without contact.

Each rotation of the rotor generates a sine and a cosine signal, which are converted into exact position values using an arctan function.

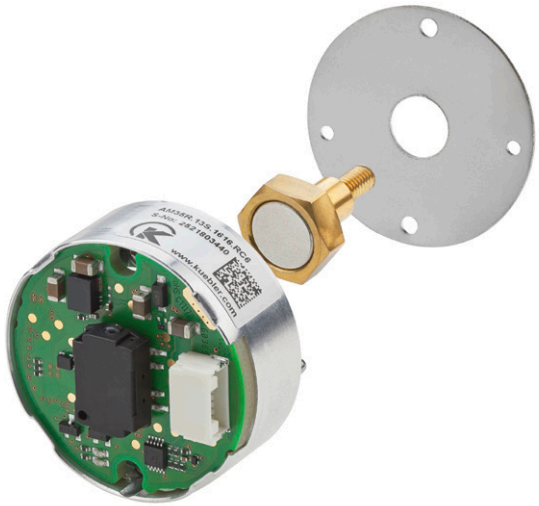


IBiSS INTERFACE SSI Push-Pull HTL RS422 TTL SinCos

Magnetic sensor technology with diametrical magnet – end of shaft

Absolute position detection

The magnetic kit encoder with diametrical magnet from Kübler is a sensor for measuring rotational angles based on the principle of magnetic field change. Unlike optical or inductive systems, it uses a magnet to determine the position.



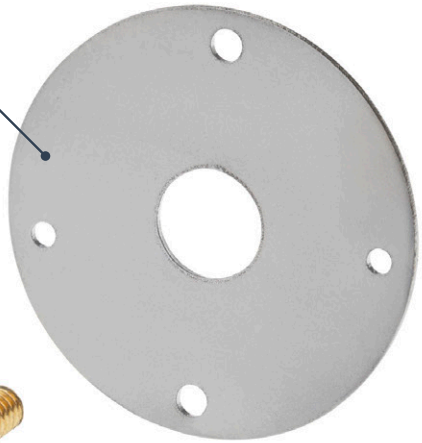
- Robust against external influences
- Easy integration directly on the shaft or in the housing
- Precise angle measurement even at high speeds
- Flexible interfaces and high accuracy

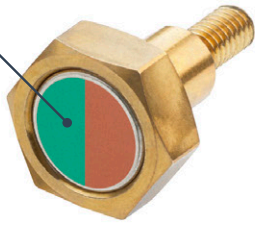
Versions

Absolute, singleturn	Provides clear position information for each angular position. The position information is retained even after a power failure.
Absolute, multiturn	Provides unique position information beyond one revolution for complex motion profiles.

Diametral magnet – the north and south poles are arranged on the sides of the cylinder / the magnet is connected to the motor shaft

Shielding plate for EMC protection against the motor brake





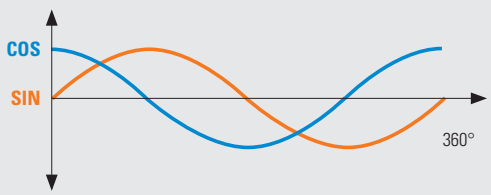
Magnetic field sensors with signal evaluation

Energy harvesting technology for multiturn detection

Functionality

When the magnet rotates with the shaft, the magnetic field changes in the plane of rotation. Sensors located directly below or next to the magnet detect the magnetic field as X and Y components, which are converted into sine and cosine signals. These values can be used to calculate the rotational position (angle) with a resolution of several thousand steps per revolution. Optionally, an energy harvesting chip ensures that the number of revolutions is stored in the event of a power failure.

Each rotation of the rotor generates a sine and a cosine signal, which are converted into exact position values using the arctan function.



IBiSS INTERFACE SSI

Magnetic sensor technology with magnetic ring

Incremental speed detection

Kübler's magnetic sensors detect the change in magnetic fields from north and south poles on a ring connected to the drive shaft. They can be flexibly adapted to the respective requirements in terms of resolution and magnetic ring geometry.

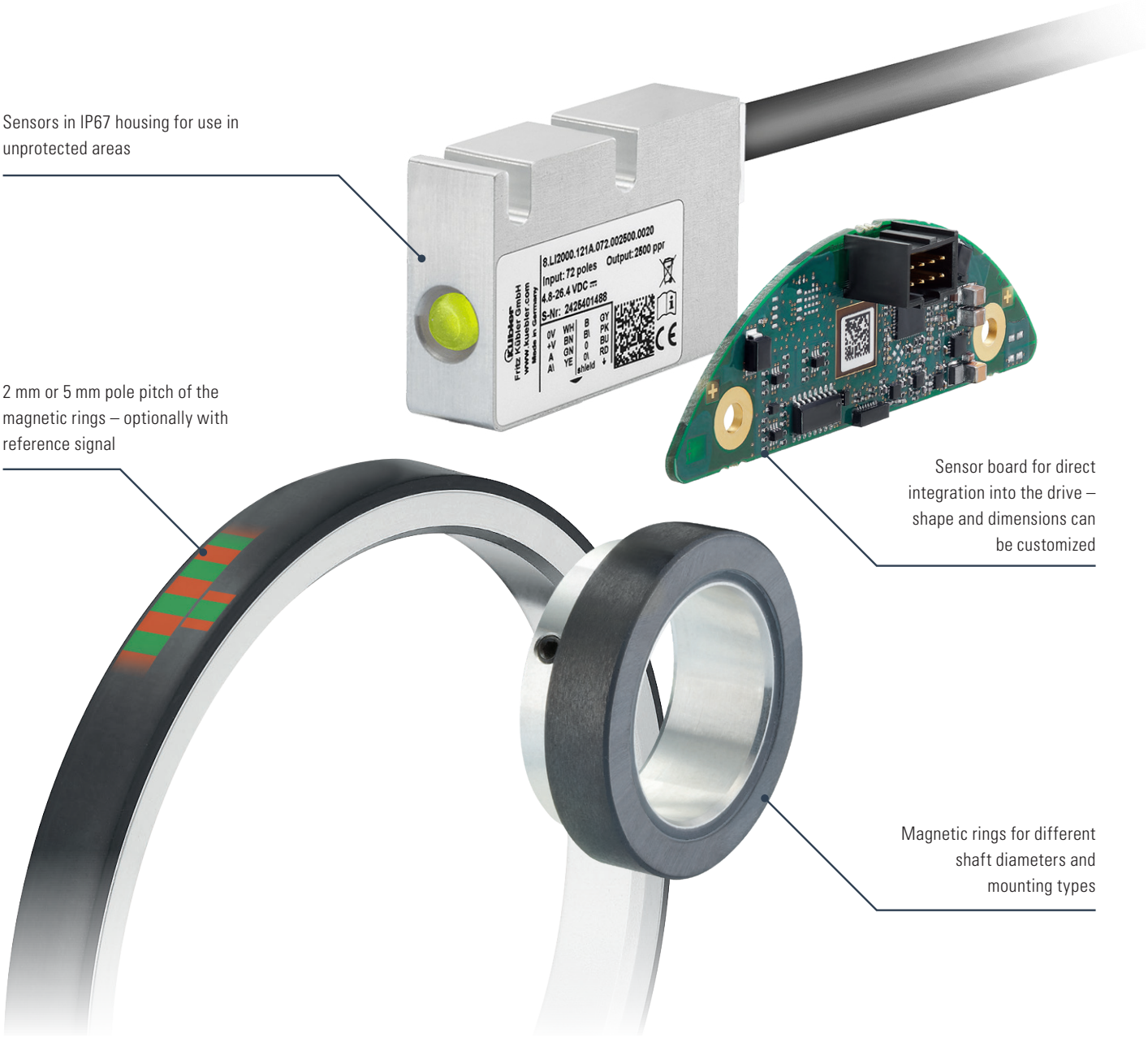
- High flexibility thanks to a wide range of magnetic rings, pole pitches, and resolutions
- Programmable resolution up to 999,999 ppr
- Resistant and insensitive
- Quick and easy commissioning

Versions

Incremental	Generate pulses with every movement for recording rotational speeds. An exact position can be determined by using a magnetic ring with a reference track.

Sensors in IP67 housing for use in unprotected areas

2 mm or 5 mm pole pitch of the magnetic rings – optionally with reference signal



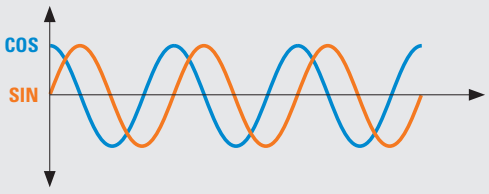
Sensor board for direct integration into the drive – shape and dimensions can be customized

Magnetic rings for different shaft diameters and mounting types

Functionality

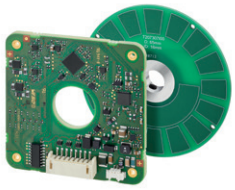
The magnetic ring is connected to the application shaft. The sensor module detects two signal periods, which are offset by 1/4 of the pole length, as input signals A and B. This results in two electrical voltages as sine and cosine signals, which are converted into square wave signals depending on the programmed number of pulses. An optional reference signal (1x per revolution) can be used to determine angular positions.

With each rotation of the rotor, sine and cosine signals are generated in the number of pole divisions on the magnetic ring, which are converted into exact position values using the arctan function.



Push-Pull HTL RS422 TTL

Comparison of integrated encoder solutions



	Inductive sensor technology	**Magnetic sensor technology with diametrical magnet – End of shaft**	**Magnetic sensor technology with magnetic ring**
Technology	Inductive detection via coils on printed circuit board	Detection of magnetic fields from a diametrical magnet at the end of the drive shaft	Detection of magnetic fields from a magnetic ring applied to the shaft
Output signals Variants	Incremental Push-Pull HTL RS422 TTL Absolute BiSS INTERFACE SSI	Absolute BiSS INTERFACE SSI	Incremental Push-Pull HTL RS422 TTL
Resolution / pulses	up to 24 bit	up to 24 bit	up to 999.999 ppr – programmable
Assembly / Installation requirements	Robust against assembly tolerances, extremely narrow design	Relatively simple assembly as a kit solution	Very large hollow shaft (up to 180 mm diameter) possible, compact installation depth
Costs / effort	Moderate installation effort, integration into the engine possible	Affordable, compact series solutions, kit-like	Possible interaction with electro-magnetic motor brakes must be taken into account.
Flexibility	Individual adaptation of PCB geometries, easily scalable	Regardless of the shaft diameter	Sensor head in housing or as printed circuit board – wide selection of rings for different shaft diameters
Limitations	Despite good tolerance: potentially higher costs and more complex integration than a simple magnetic solution	Magnetic technology can be more sensitive to strong external magnetic fields	Magnetic technology may be more sensitive to strong external magnetic fields
Summary recommendation	For robust signal detection in environments with dirt, oil, or tight installation conditions	Cost-effective solution for compact series motors with free shaft end	Wide range for different shaft diameters

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Kübler Group
Fritz Kübler GmbH
Schubertstrasse 47
78054 Villingen-Schwenningen
Germany

Phone +49 7720 3903-0
Fax +49 7720 21564
info@kuebler.com

kuebler.com

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