



SAE J1939

CANopen

Analog  
output



- Incremental Encoders
- Absolute Encoders
- Bearingless Encoders
- Draw-wire Encoders
- Inclinometers
- Slip Rings
- Counters and Process Devices

# Kübler worldwide

The Kübler Group is a worldwide leading and strongly growing family-run company with four production sites, eleven subsidiaries and strong agents in more than 50 countries.

Kübler always focuses on understanding the application of the customer. This results in suitable products and solutions. So trust in a technically well-founded advice and benefit from a lasting application support. Over 480 persons are working all over the world for Kübler and pursue one goal: inspire their customers!



## Europe

Austria  
Belarus  
Belgium  
Bulgaria  
Croatia  
Czech Republic  
Denmark  
Estonia  
Finland  
France  
Germany  
Great Britain  
Greece  
Hungary  
Iceland  
Ireland

Lithuania  
Italy  
Netherlands  
Norway  
Poland  
Portugal  
Russia  
Slovakia  
Slovenia  
Spain  
Sweden  
Switzerland  
Turkey  
Ukraine

## Africa

Egypt  
Morocco  
South Africa  
Tunisia

## North and South America

Argentina  
Brazil  
Canada  
Mexico  
Peru  
U.S.A.

## Oceania

Australia  
New Zealand

## Asia

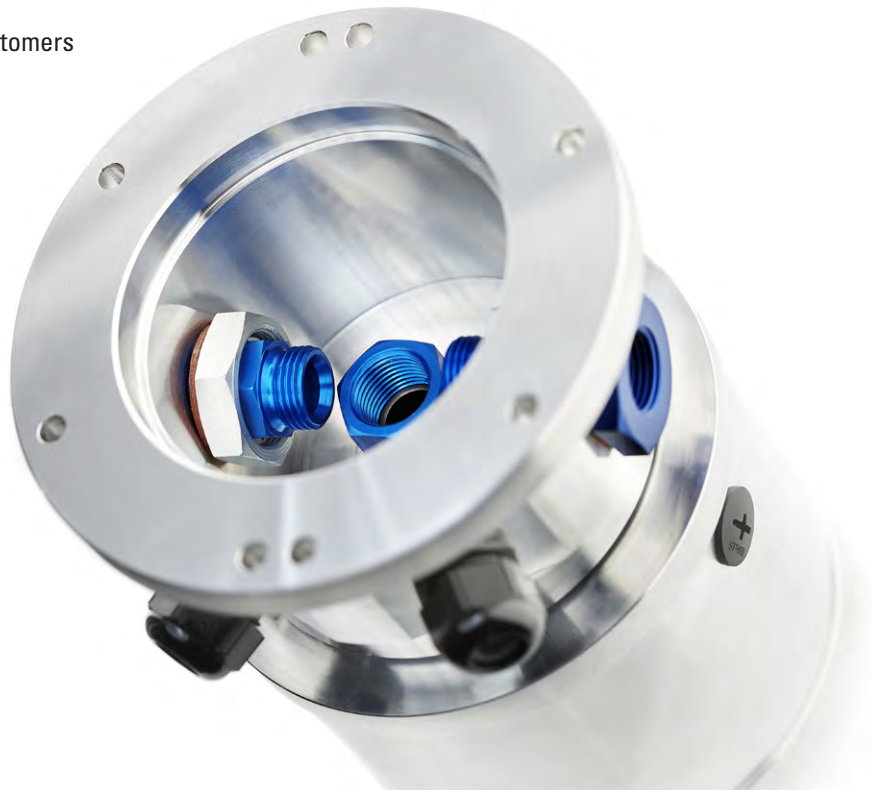
China  
Hong Kong  
India  
Indonesia  
Israel  
Lebanon  
Malaysia  
Philippines  
Singapore  
South Korea  
Taiwan, R.O.C  
Thailand  
United Arab Emirates  
Vietnam



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Added value for our customers



## Flexibility and quality

A wide product range characterized by high quality standards allows us to meet a variety of very different customer requirements. In addition, our constant goal is to reduce system costs and to create added value thanks to innovations.

## Innovation and partnership

For us, innovation comes from creativity that allows us thinking out of the box. We develop, jointly with our customers, novel products, solutions and services. Thanks to the close proximity to our customers, we make sure that our innovations meet all their requirements.



Headquarters in Villingen-Schwenningen







## Robust and durable

Kübler sensors and slip rings are developed for use in demanding environments. In mobile machinery, they have been performing their services and ensuring stability for many years. They withstand most adverse conditions in dust and street salt, fog and rain water environments, direct sun and icy temperatures.

## Customer-specific development

Standardizing and modularization are of essential importance in the mobile automation. Nevertheless, special solutions are still an important element in many companies to allow them realizing customer-specific applications. Kübler has been proving for many years its ability to respond flexibly to special solutions, especially in the mobile automation, where an optimal connection of the sensor or slip ring to the machine is required. In short: we offer the ideal solution for your vehicle.

## Kübler Group – 55 years of innovation

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. Ten international group members and distributors in more than 50 countries offer local product know-how, service and advice throughout the world. Innovative product and sector solutions, as well as solutions for functional safety and a high level of service, are the reasons behind our global success. The strict focus on quality ensures the highest levels of reliability and a long service life for our products in the field. Over 480 dedicated people worldwide make this success possible and ensure that customers can continue to place their trust in our company.



## Fire trucks / Ladder trucks / Rescue platforms

Developed for increasingly tough requirements: Kübler encoders, draw-wire systems, slip rings and inclinometers measure and control positions and angles reliably and accurately. Thanks to their robust bearing structure, the sensors withstand also severe „knocks“ in harsh and inaccurate installation conditions.

The high IP67 protection ensures tightness in case of intensive outdoor applications. Sensors with IP69k protection can also be steam-jet-cleaned with the machine.

### Ladder rotation / Ladder length ①

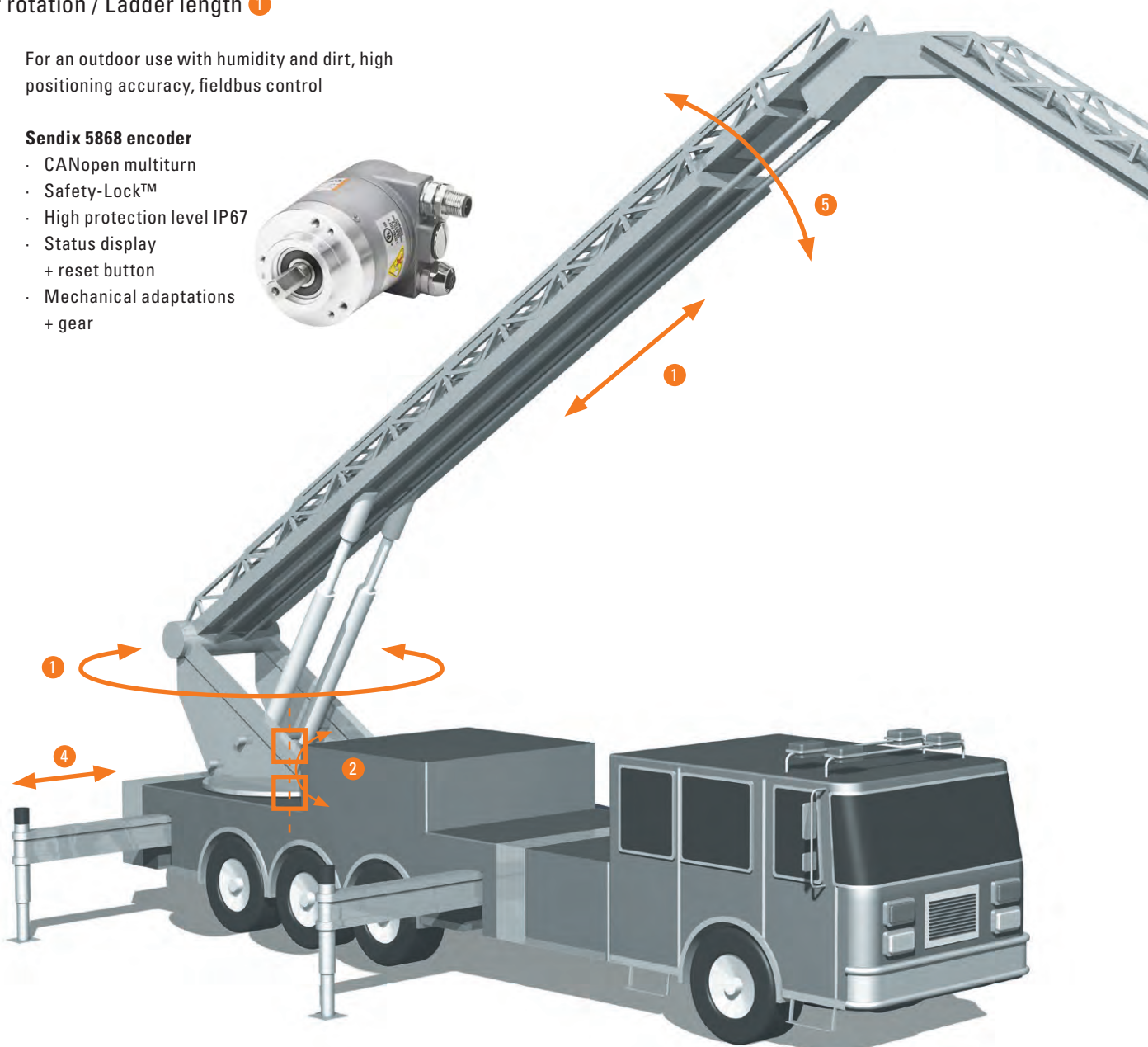


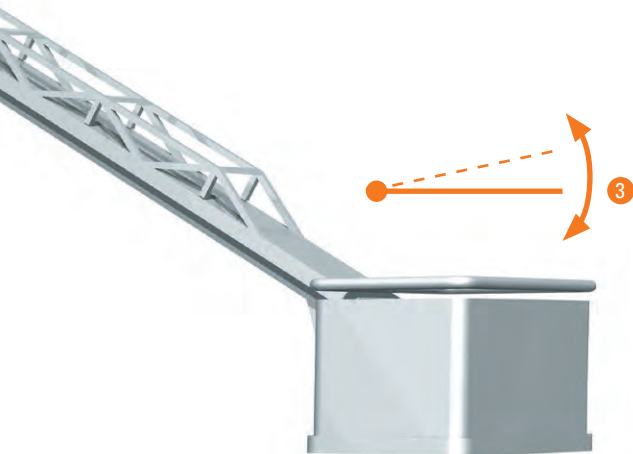
For an outdoor use with humidity and dirt, high positioning accuracy, fieldbus control



#### Sendix 5868 encoder

- CANopen multiturn
- Safety-Lock™
- High protection level IP67
- Status display + reset button
- Mechanical adaptations + gear





## Data / load transmission 2



Transmission of load, signal and fieldbus communication from the undercarriage to the rotary platform, additionally with media lead-through in air or hydraulic variant

### Slip ring SR160

- Robust: aluminum or stainless steel housing
- Transmission of up to 30 channels (load, data, signal, fieldbus or Ethernet)
- Max. load current 50 A
- High protection level IP65, high-quality seals



## Horizontal basket position 3



Dynamic measurement for the correction of the horizontal operator basket position, inclinometer with high IP protection level and stable measuring value throughout time and temperature

### Inclinometer IN88

- CANopen interface
- High protection level IP69k
- 1-dimensional



## Leg position 4



Linear measurement of the stroke up to 2 m, accurate speed and position with a compact size

### Miniature draw-wire system A40 / A41

- Analog output
- Measuring length 2 m



## Ladder elevation angle 5



For an outdoor use with humidity for absolute angle measurement with fieldbus control, robust encoder requiring little space

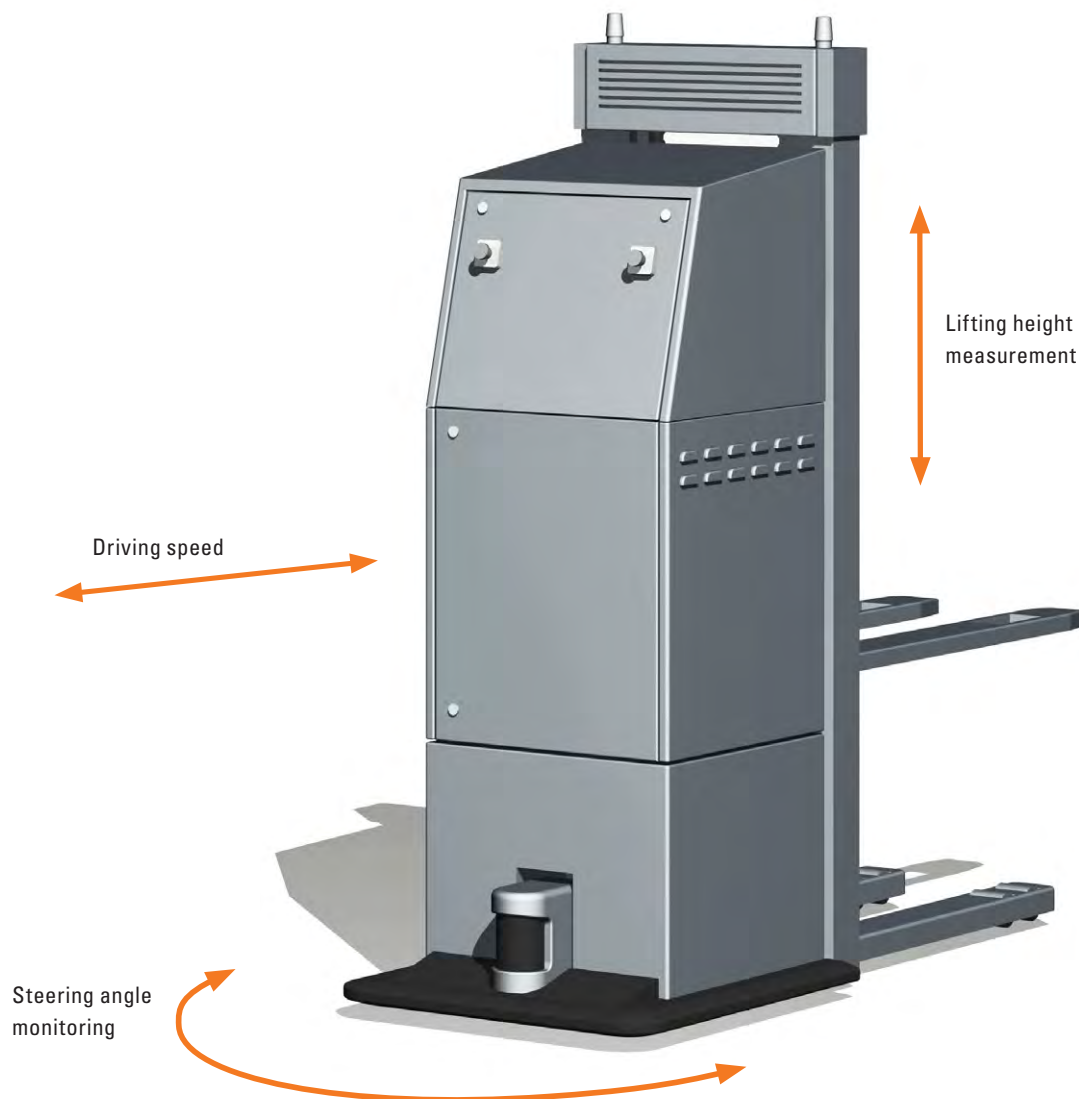
### Sendix M36 encoders

- ø 36 mm size
- CANopen interface
- Magnetic scanning
- Safety-Lockplus™
- High protection level IP69k
- Status display



## Automatic guided vehicles

Compact encoders and draw-wire systems of Kübler are used to determine the speed, the steering angle of the vehicles and the exact position of the load-carrying devices. Their accurate rotary speed and position signals ensure the reliable operation of the intelligent systems - even when only very little space is available. BUS systems ensure the safe signal transmission and simplify notably the cabling work.





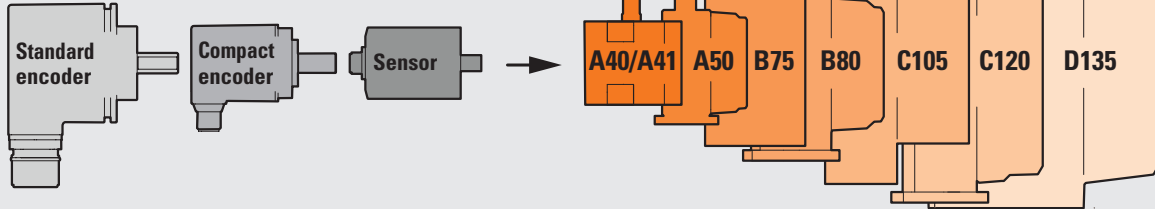
# DRAW WIRE ENCODERS COMPACT & PERFORMANCE

Encoder / Sensor

Analog  
Incremental  
CANopen  
SAE J1939  
SSI  
PROFIBUS DP  
EtherCAT  
PROFINET IO  
EtherNet/IP  
Modbus

Analog  
Incremental  
CANopen  
SAE J1939  
SSI

Analog



Draw wire mechanics

## Lifting height measurement



Linear measurement up to 3 or 6 m, absolute value acquisition via fieldbus, high accuracy

### Draw-wire encoder A41

- Measuring length 2 m
- CANopen interface
- Robust housing
- High dynamic up to 1 m/s



### Draw-wire encoder B75

- Measuring length 3 m
- Fieldbus interface
- With optical multiturn encoder
- Robust housing
- Linearity up to  $\pm 0.35\%$  of the measuring range



### Draw-wire encoder B80

- Measuring length 3 m
- Fieldbus interface
- Interchangeable installation
- With optical multiturn encoder
- Robust housing
- Linearity up to  $\pm 0.02\%$  of the measuring range

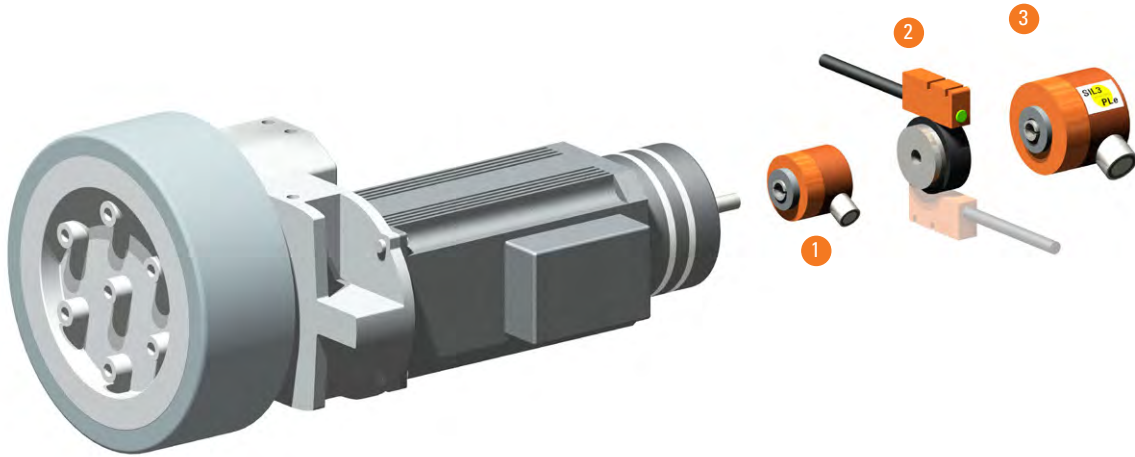


### Draw-wire encoder C120

- Measuring length 6 m
- Fieldbus interface
- Interchangeable installation
- With optical multiturn encoder
- Robust housing
- Linearity up to  $\pm 0.02\%$  of the measuring range



## Application examples



## Driving speed



Dynamic rotary speed measurement with reduced space requirements in hollow shaft version

### Sendix S3674 Motor Feedback System 1

- Singleturn encoder  $\varnothing$  36 mm
- SIL2/PLd
- Operating temperature  
-30°C ... +120°C
- Accurate optical scanning
- Tapered shaft  $\varnothing$  8 mm



### Sendix Base KIH40 encoder 1

- Incremental encoder  $\varnothing$  40 mm
- Optical scanning
- Safety Lock™
- Resolution max. 2500 ppr



### RLI20 bearingless encoder 2

- Magnetic scanning
- Resolution max. 3600 ppr
- High protection level up to IP69k



### Sendix 5834FS encoder 3

- Incremental encoder  $\varnothing$  58 mm
- Accurate optical scanning
- SIL2/PLd, SIL3/PLe
- Resolution max. 2048 ppr





## Steering angle monitoring



Absolute angle measurement with fieldbus control, robust encoder with reduced space requirements

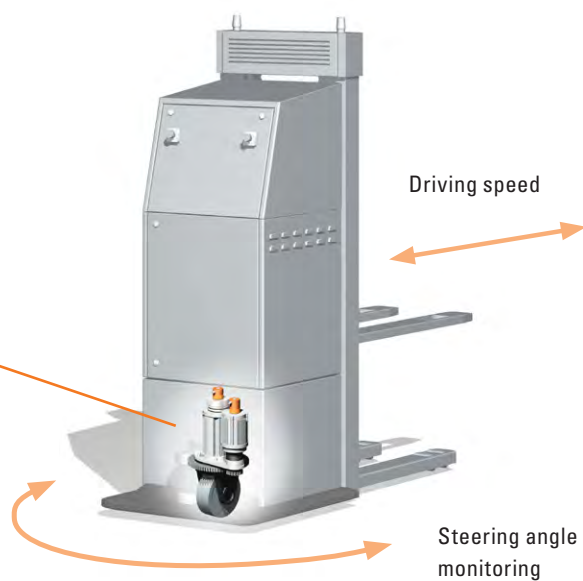
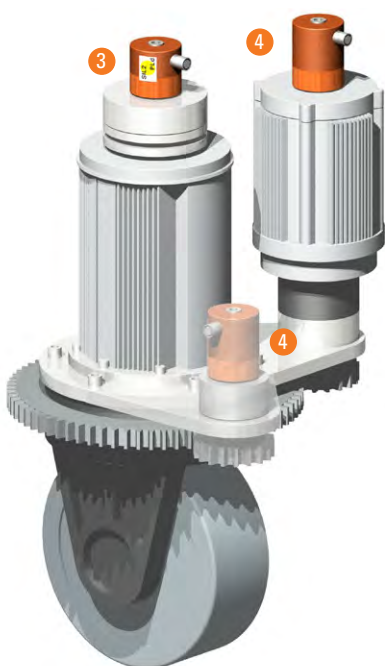
### Sendix M36 encoders 4

- ø 36 mm size
- CANopen interface
- Magnetic scanning
- Safety-Lockplus™
- High protection level IP69k
- Status display



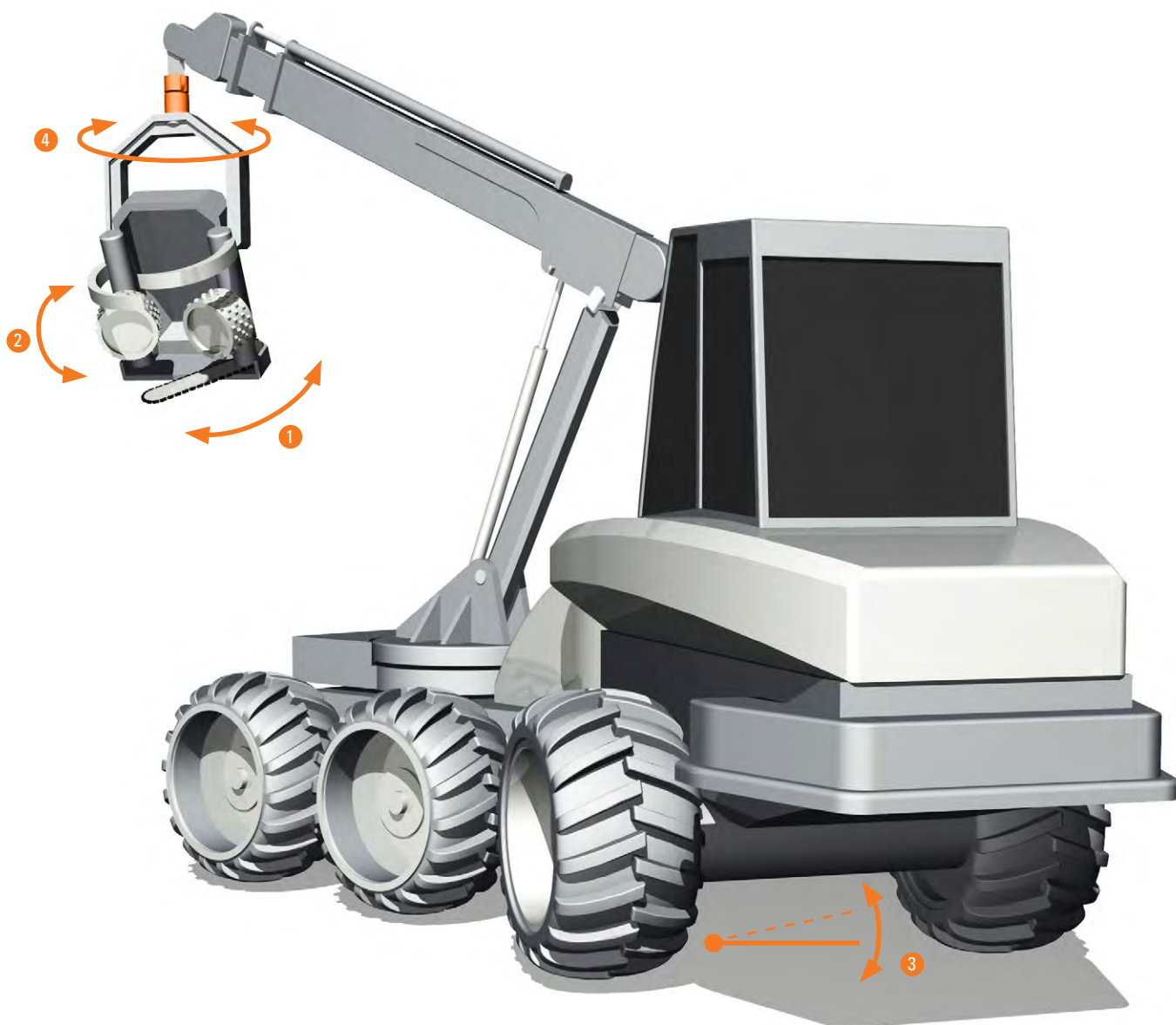
### Sendix F5888 encoder 4

- ø 58 mm size
- CANopen interface
- Optical scanning



## Agricultural and forestry machinery

The Kübler encoders and inclinometers can cope with the demanding requirements of the agricultural and forestry branch. They ensure a safe and accurate operation of the machines. Inclinometers monitor the horizontal position of the vehicle and warn in case of an excessive inclination. Encoders measure the setting angle and the speed and feed of the work equipment. Compact miniature encoders can be integrated in an existing device, if the customer wishes so, and make the big difference thanks to their intelligent extra features.







### Saw blade setting angle ①



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

#### Sendix M36 encoders

- $\varnothing$  36 mm size
- SAE J1939 interface
- Magnetic scanning
- Safety-Lockplus™
- High protection level IP69k
- Status display



### Feedrate and position ②



Trunk length measurement at the feed wheel, dynamic rotational speed measurement requiring little space

#### Sendix 5000 encoder

- Incremental encoder  $\varnothing$  50 mm
- Safety-Lock™
- Operating temperature -40°C ... +85°C
- High shaft load: 50 N axial and 100 N radial



### Vehicle balance control ③



Dynamic balance display via an analog value with high protection against humidity

#### Inclinometer IN81

- Analog output
- SAE J1939 interface
- High protection level IP69k
- 1-dimensional



### Endless rotating harvester head ④



Transmission of load, data and signals from the boom to the endless rotating harvester head

#### Slip ring SR075

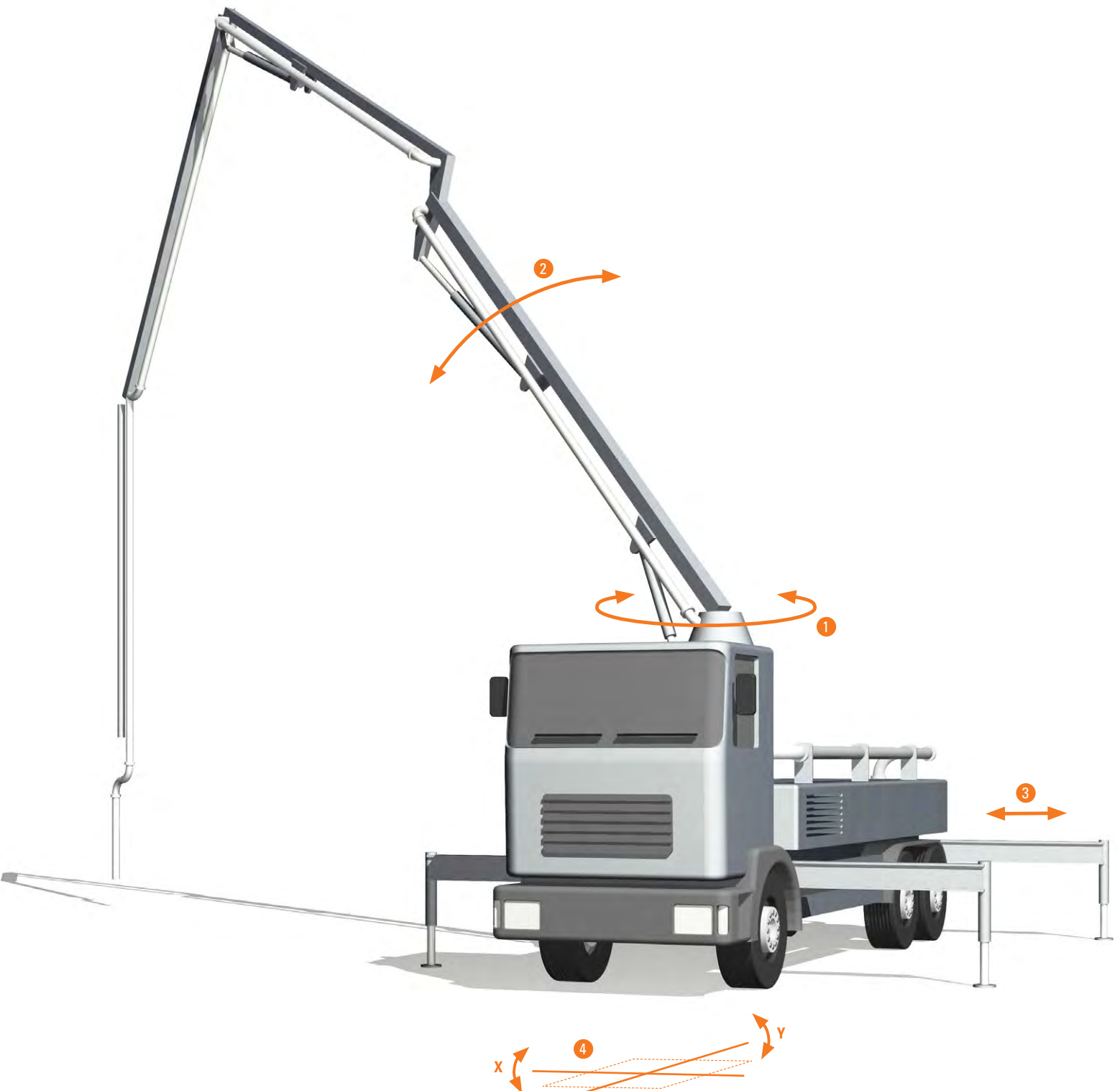
- Individual slip ring solution
- Compact and robust
- Transmission of load, data and signals



## Construction machinery / Concrete pumps

BUS systems are a standard in passenger cars for years. They are now increasingly used also in mobile machines.

Rough positioning using analog values is replaced with accurate angular sensors with CAN bus. Encoders and draw-wire systems mounted in construction machines cope with the most demanding requirements, both on the work site and underground.





### Angle of rotation of the concrete distribution mast ①



Outdoor use with humidity and dirt, high positioning accuracy, fieldbus control

#### Sendix M3668R encoder

- CANopen multiturn
- Safety-Lockplus™
- High protection level IP69k
- Status display + reset button
- Measuring pinion on the encoder shaft



### Elevation angle ②



Dynamic measurement of the elevation angle of the mast, inclinometer with high IP protection level and stable measuring value throughout time and temperature

#### Inclinometer IN88

- CANopen interface
- High protection level IP69k
- 1-dimensional



### Leg position ③



Position measurement of the telescopic leg, linear measurement of the stroke up to 5 m, speed and position control via BUS

#### Draw-wire encoder C100

- CANopen interface
- High protection level IP67
- Redundant sensors
- Measuring length 1 m ... 5 m
- Easy mounting
- Operating temperature -40°C ... +85°C



### Vehicle balance control ④



Dynamic and exact balance display via CANopen, high protection against humidity and dirt

#### Inclinometer IN88

- CANopen interface
- High protection level IP69k
- 2-dimensional



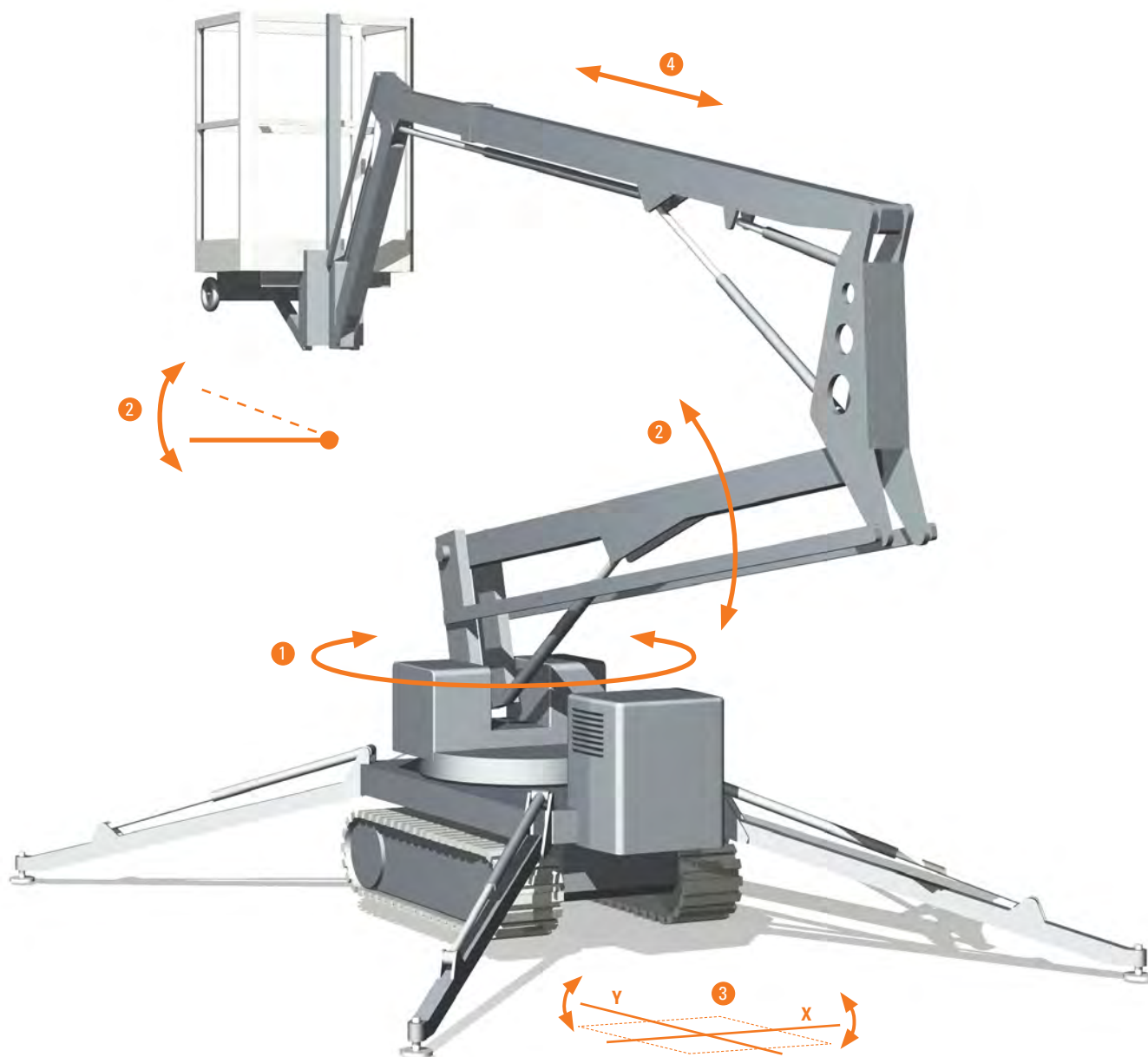


## Working platforms

Flexibility, speed and safety are the main features of working platforms.

The requirements for fast installation and access, as well as absolute stability whatever the inclination or the nature of the ground call for tailor-made sensors both for monitoring and automation purposes.

Only highest safety standards can be sufficient were people are at work. Kübler sensors monitor the position of the operator basket and the levelling of the chassis – both for self-propelled and for trailer or truck-mounted working platforms.







### Angle of rotation of the mast ①



Outdoor use with humidity and dirt, high positioning accuracy, fieldbus control

#### Sendix M3661 encoder

- Analog multiturn encoder
- Safety-Lock™
- High protection level IP67
- Status display + reset button
- Measuring pinion on the encoder shaft



### Mast elevation angle ②



Dynamic measurement of the elevation angle of the mast, inclinometer with high IP protection level and stable measuring value throughout time and temperature

#### Inclinometer IN81

- Analog output
- High protection level IP69k
- 1-dimensional



### Chassis balance control ③



Dynamic balance display via an analog value for self-levelling of the chassis, high protection against humidity

#### Inclinometer IN81

- Analog output
- High protection level IP69k
- 2-dimensional



### Telescopic mast length ④



Linear measurement of the stroke up to 2 m, accurate speed and position with a compact construction

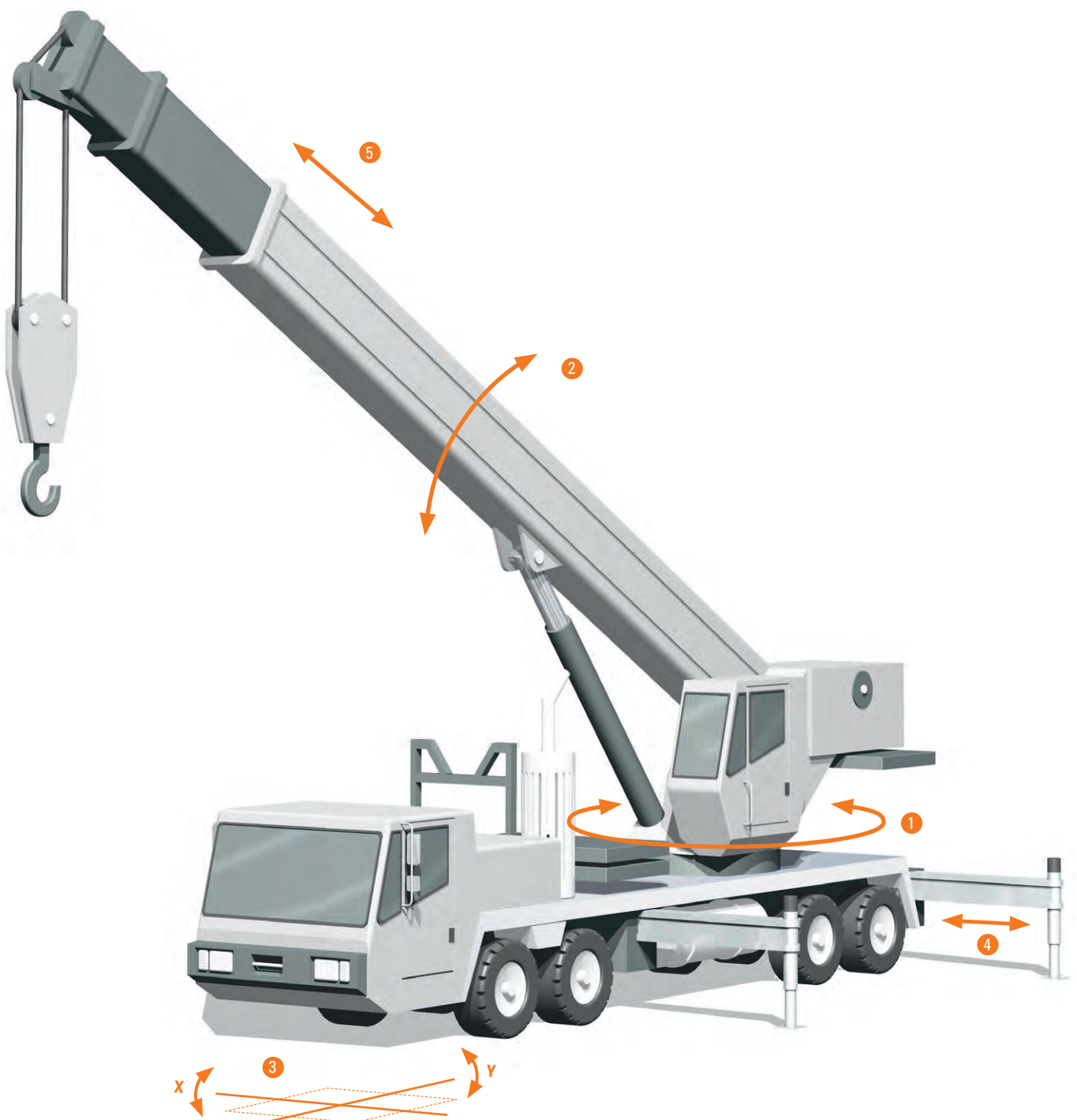
#### Miniature draw-wire encoder A40 / A41

- Analog output
- Measuring length 2 m



## Mobile cranes

Mobile cranes are used whenever heavy loads must be handled – on public roads or on difficult terrain. High reliability and safety are the requirements for mobile boom cranes. Sensors play a major role here. Kübler offers the suitable solution for any imaginable task based on robustness, premium quality and long service life. Our encoders, draw wire systems and inclinometers measure reliably every movement and ensure the faultless operation of your mobile cranes. Take advantage of countless ordering options and of the wide range of suitable interfaces, from analog up to CANopen.





### Turret rotation ①



Outdoor use with dirt, high positioning accuracy, fieldbus control

#### Sendix M5868 encoders

- Magnetic scanning
- Electronic, multitrack gearless encoder
- CANopen interface



### Boom elevation + vehicle levelling ② + ③



Dynamic and accurate measurement of the vehicle levelling and of the mast elevation angle via BUS interface

#### Inclinometer IN88

- CANopen interface
- High protection level IP69k
- 2-dimensional



### Outriggers ④



Position measurement of the telescopic outriggers, linear measurement up to 5 m, speed and position control via BUS interface

#### Draw-wire encoder A41 / C100

- A41 compact size with CANopen interface
- C100 redundant sensors with integrated inclinometer



### Boom length and elevation ⑤ + ②



Dynamic and accurate measurement of the mast elevation angle and extension length in one device



#### Draw-wire encoder D125

- Redundant sensors
- Integrated inclinometer
- Measuring length up to 10 m





# Encoders

Encoders are used everywhere lengths, positions, rotary speeds and angles are to be measured. They convert mechanical movements into electrical signals. Incremental encoders deliver signal periods whose number can be a measure for the rotary speed, the length or the position. In absolute encoders, a unique code pattern is assigned to every position. Even after power failure, the current position is immediately available after re-powering.

## Absolute singleturn / multiturn encoders



	<b>Sendix M36</b>	<b>Sendix M36R</b>	<b>Sendix F5868 / F5888</b>	<b>Sendix 5868 / 5888</b>
Characteristics	<ul style="list-style-type: none"> <li>· Compact and robust angle sensor</li> <li>· EHT multiturn technology without battery and without gear</li> </ul>	<ul style="list-style-type: none"> <li>· Compact and robust multiturn encoder</li> <li>· EHT multiturn technology without battery and without gear</li> </ul>	<ul style="list-style-type: none"> <li>· Multiturn encoders acc. to industry standard</li> <li>· Through hollow shaft available</li> <li>· Accurate optical scanning and interference-free electronic IST multiturn technology</li> </ul>	<ul style="list-style-type: none"> <li>· Multiturn encoders acc. to industry standard</li> <li>· Variable connection technology</li> <li>· Accurate optical scanning</li> <li>· Interference-free multiturn gear</li> </ul>
Size	ø 36 mm	ø 36 mm	ø 58 mm	ø 58 mm
Measuring principle	Magnetic, absolute	Magnetic, absolute	Optical, absolute	Optical, absolute
Electrical interface	Analog CANopen SSI SAE J1939	Analog CANopen SSI SAE J1939	CANopen EtherNet/IP	CANopen PROFIBUS DP PROFINET IO EtherCAT
Resolution max.	14 bit singleturn	13 bit singleturn (max. 14 bit) 12 bit multiturn (max. 24 bit)	13 bit singleturn (max. 16 bit) 12 bit multiturn (max. 16 bit)	13 bit singleturn (max. 16 bit) 12 bit multiturn
Protection level	IP67, IP69k	IP67, IP69k	IP65, IP67	IP65, IP67
Type of connection	Cable M12 connector	Cable M12 connector	Cable M12 connector	Cable M12 connector M23 connector Fieldbus hood





## Incremental encoders



	<b>2400 / 2420</b>	<b>Sendix 5000 / 5020</b>	<b>RI50 / Limes LI50</b>	<b>RLI Performance</b>
Characteristics	<ul style="list-style-type: none"> <li>High-resolution miniature encoder</li> <li>Ideal for use in restricted spaces or for integration in gear limit switches</li> </ul>	<ul style="list-style-type: none"> <li>Robust and versatile incremental encoder</li> </ul>	<ul style="list-style-type: none"> <li>Bearingless and extremely slim incremental encoder</li> <li>Rings flexibly adaptable to the shaft diameter</li> </ul>	<ul style="list-style-type: none"> <li>Smart bearingless encoders</li> <li>Freely adjustable line count with reference signal(s)</li> <li>Status LED, Status output</li> <li>Optional integrated vibration sensor (possibility for condition monitoring and predictive maintenance)</li> <li>Integrated digital signal filters and electronic type label with user memory</li> </ul>
Size	ø 24 mm	ø 50 mm	16 mm mounting depth	Sensor head 100 x 60 x 25 mm
Measuring principle	Optical, incremental	Optical, incremental	Magnetic, incremental	Magnetic ring
Electrical interface	Push-pull	RS422 Push-pull Open collector	RS422 Push-pull	RS422 Push-pull SSI, BiSS Analog
Resolution max.	1.024 ppr	5.000 ppr	3.600 ppr	Resolution freely programmable (in the factory or by the customer)
Protection level	IP50, IP64 (housing IP65)	IP65, IP67	IP67, IP68/IP69k	IP67
Type of connection	Cable	Cable M12 connector M23 connector MIL connector	Cable	M12 connector

You will find further encoders on our Internet website under [www.kuebler.com/encoders](http://www.kuebler.com/encoders)

# Inclinometers

Inclinometers are used to measure deviations with respect to a horizontal rotation axis over an angular range that can reach 360°. Kübler inclinometers are based on the MEMS technology (Micro-Electro-Mechanical System).



	IN81	IN88
Characteristics	<ul style="list-style-type: none"> <li>· Robust housing</li> <li>· Flexibly adjustable to the application</li> <li>· Optional additional adjustable limit switches</li> <li>· With 1 x M12 connector and practical teach adapter</li> </ul>	<ul style="list-style-type: none"> <li>· Robust housing</li> <li>· Flexibly adjustable to the application</li> <li>· Optional additional adjustable limit switches</li> <li>· 2 x M12 connectors for easy BUS-in/BUS-out wiring</li> </ul>
Measuring ranges	1-dimensional 0 ... 360° 2-dimensional ±10°, ±45°, ±60°	1-dimensional 0 ... 360° 2-dimensional max. ±85°
Electrical interface	4 ... 20 mA 0.1 ... 4.9 V 0.5 ... 4.5 V 0 ... 5 V 0 ... 10 V Optional switching outputs	CANopen Optional limit switch SAE J1939
Setting	<ul style="list-style-type: none"> <li>· Zero point setting</li> <li>· Measuring range setting</li> <li>· Filter matching</li> </ul>	<ul style="list-style-type: none"> <li>· Zero point setting</li> <li>· Measuring range setting</li> <li>· Filter matching via CANopen</li> </ul>
Accuracy	±0.1°	±0.1°

You will find further inclinometers on our Internet website under [www.kuebler.com/inclinometers](http://www.kuebler.com/inclinometers)

## Slip rings

When it comes to transmitting electrical signals, energy, gases or liquid media from a static to a rotating component, Kübler slip rings offer the optimal solution. High current carrying capacity, reliable signal and data transmission with high transmission rates, combined with long service life and easy handling are some of the main requirements met by Kübler slip rings.

Kübler slip rings are the result of highest quality awareness and a careful selection of materials – made in Germany. We focus on your application: we realize modifications and special solutions quickly and simply.



	SR075	SR120	SR160	SR250H
Characteristics	<p><b>Compact and robust</b> This compact and robust design is ideal for Mobile Automation applications. Optimal combination of fieldbus communication with load transmission in the on-board network area.</p>	<p><b>Flexible and fast</b> The slip ring SR120 is ideal for applications requiring high transmission rates. Its specially developed shield concept allows parallel transmission of load currents up to 25 A and of data up to 100 Mbit/s.</p>	<p><b>Powerful and flexible</b> The modular construction and variable connection possibilities allow obtaining a customized product. Load currents up to 50 A combinable with signal, fieldbus and Ethernet transmission. The innovative contact technology ensures a long, low-maintenance and reliable operation.</p>	<p><b>High-current transmission</b> The SR250H transmits simultaneously currents up to 120 A, signals and fieldbus or Ethernet data. Its robust construction and a wide variety of connection possibilities allow adapting it individually to the application. It convinces with its high reliability.</p>
Size	75 x 85 mm	ø 120 mm	ø 160 mm	ø 250 mm
Protection	IP64 (IP65 on request)	Max. IP65	Max. IP65	Max. IP65
Transmission paths	2 load channels 6 signal channels Fieldbus transmission	Up to 20 load and signal channels Fieldbus transmission Ethernet transmission	Load and signal channels Fieldbus transmission Ethernet transmission	Load and signal channels Fieldbus transmission Ethernet transmission
Contact materials	Gold/Gold	Copper/Bronze Silver/Precious metal	Copper/Bronze Silver/Precious metal Gold/Gold Silver/Silver	Copper/Bronze Silver/Precious metal Silver/Silver
Load current	0 ... 20 A 0 ... 48 V	0 ... 25 A 0 ... 400 V	0 ... 50 A 0 ... 400 V	0 ... 120 A 0 ... 480 V

You will find further slip rings on our Internet website under [www.kuebler.com/slirings](http://www.kuebler.com/slirings)

# Draw-wire encoders

The core of a draw-wire device is a drum mounted on bearings, onto which a wire is wound. Winding takes place via a spring-loaded device. An encoder measures the number of revolutions. If the circumference of the drum is known, length can be calculated.



	<b>Draw-wire encoder C100</b>	<b>Draw-wire encoder D125</b>	<b>Draw-wire enc. A40 / A41</b>	<b>Draw-wire encoder B75</b>
<b>Characteristics</b>	<p><b>Mobile-Robust and cost-effective</b></p> <ul style="list-style-type: none"> <li>· 0.9 mm thick measuring wire</li> <li>· Protection level IP67</li> <li>· Temperature range -40°C ... +85°C</li> <li>· All interfaces, also redundant with double sensor electronics</li> <li>· Optionally with integrated inclinometer for measuring the mast elevation angle</li> </ul>	<p><b>Mobile-Robust and cost-effective</b></p> <ul style="list-style-type: none"> <li>· 0.8 mm thick measuring wire</li> <li>· Sensor with protection level IP67</li> <li>· All interfaces, also redundant with double sensor electronics</li> <li>· Optionally with integrated inclinometer for measuring the mast elevation angle</li> </ul>	<p><b>Compact and cost-effective</b></p> <ul style="list-style-type: none"> <li>· Most compact draw-wire encoder with 2 m measuring length</li> <li>· Optional as low-temperature version</li> </ul>	<p><b>Compact and cost-effective</b></p> <ul style="list-style-type: none"> <li>· Compact construction</li> <li>· Flexible mounting</li> <li>· Wear-free wire exit</li> </ul>
<b>Size</b>	108 x 98 x 68.4 mm	approx. 124 x 124 x 94 mm	approx. 50 x 50 x 77 mm	78 x 78 x 55 mm
<b>Measuring lengths</b>	1 m ... 5 m	6 m ... 10 m	1 m, 2 m	3 m
<b>Electrical interface</b>	Analog sensor Incremental output CANopen Relay output Switch output (also with redundant outputs)	Analog sensor CANopen Inclinometer (also with redundant outputs)	Analog sensor CANopen	Analog sensor CANopen SSI PROFIBUS DP PROFINET IO
<b>Resolution</b>	Analog 12 bit CANopen ≤ 0.3 mm	Analog 12 bit CANopen ≤ 0.6 mm	0.2 mm	0.2 mm
<b>Accuracy/Linearity</b>	Analog approx. ±0.8 % CANopen approx. ±0.5 %	Analog approx. ±0.8 % CANopen approx. ±0.5 %	Approx. ±0.35 %	Approx. ±0.35 %































	<b>Draw-wire encoder C60</b>	<b>Draw-wire encoder D120</b>	<b>Draw-wire encoder C120</b>	<b>Draw-wire encoder D135</b>
<b>Characteristics</b>	<p><b>Robust and versatile</b></p> <ul style="list-style-type: none"> <li>Protection level up to IP69k</li> <li>Wide temperature range -40°C ... +85°C</li> <li>Titanium-anodized aluminum housing</li> <li>Various constructions: open, closed housing or housing with perforated sheet steel cover</li> <li>Stable measuring wire (stainless steel, V4A) wire diameter up to ø 1 mm - ideal for outdoor applications</li> </ul>	<p><b>Extremely robust and dynamic</b></p> <ul style="list-style-type: none"> <li>Draw-wire encoder for outdoor</li> <li>Sensor with protection level IP69k and temperature level -40°C ... +85°C</li> <li>Stable measuring wire (stainless steel, V4A), wire diameter up to 1.5 mm</li> <li>All interfaces, also redundant with double sensor electronics</li> </ul>	<p><b>Highly accurate and dynamic</b></p> <ul style="list-style-type: none"> <li>Excellent linearity up to ± 0.02% of the measuring range</li> <li>Robust housing</li> <li>High dynamics up to 10 m/s</li> <li>Customer-specific adaptations possible</li> </ul>	<p><b>Highly accurate and dynamic</b></p> <ul style="list-style-type: none"> <li>Measuring lengths up to 42.5 m</li> <li>Can be combined with Kübler Sendix encoders and with analog sensors</li> </ul>
<b>Size</b>	60 x 60 x 125 mm	approx. 120 x 125 x 133 mm	approx. 120 x 120 x 120 mm	135 x 135 x 318 mm
<b>Measuring lengths</b>	4 m	3 m ... 10 m	6 m	8 m, 10 m, 12 m, 15 m, 20 m, 25 m, 30 m, 35 m, 40 m, 42.5 m
<b>Electrical interface</b>	Analog sensor CANopen (also with redundant outputs)	Analog sensor CANopen Potentiometer (also with redundant outputs)	Analog sensor CANopen PROFIBUS DP PROFINET IO Incremental push-pull / RS422	Analog sensor CANopen PROFIBUS DP PROFINET IO Incremental push-pull / RS422
<b>Resolution</b>	Depending on the encoder	Analog 16 bit	0.08 mm	0.08 mm
<b>Accuracy / Linearity</b>	Approx. ±0.1 %	Approx. ±0.1 %	Analog approx. ±0.1 % CANopen approx. ±0.05 %	Analog approx. ±0.1 % CANopen approx. ±0.05 %

You will find further draw-wire systems on our Internet website under [www.kuebler.com/draw-wire\\_encoders](http://www.kuebler.com/draw-wire_encoders)

## Portfolio overview draw-wire encoders

	Characteristics			Draw-wire encoders			Measuring length													
	Linearity max.	Speed [m/s]	Wire diameter [mm]	Measuring length [m]			Short range			Mid range				Long range						
				Encoder	Analog sensor	Features	0	1	2	3	4	5	6	8	10	12	15	max. 42.5		
Performance-Line	±0.02 %	10	0.5	 <b>A50</b>	INC ABS	U I R														
				 <b>B80</b>	INC ABS	U I R														
				 <b>C120</b>	INC ABS	U I R														
				 <b>D135</b>	INC ABS	U I R														
Robust-Line	±0.1 %	3	1.0	 <b>C60</b>	ABS	U I R	RED													
			1.5	 <b>D120</b>	ABS	U I R	RED													
Compact-Line	±0.3 %	3	0.9	 <b>A30</b>		U I R														
				 <b>A40</b>	INC	U I R														
				 <b>A41</b>	ABS	U I R														
				 <b>B75</b>	INC ABS	U I R														
				 <b>C105</b>	INC ABS	U I														
Base-Line	±0.5 %	1	0.9	 <b>C100</b>	INC ABS	U	N RS RED													
				 <b>D125</b>	ABS	U	N RED													

**INC** Incremental                      **U** Voltage                      **N** Inclinator  
**ABS** Absolute, digital                **I** Current                        **RS** Relays / switch output  
**R** Potentiometer                        **RED** Redundant sensors

# Counters and process devices

The main task of the Kübler counters is the direct or scaled display of electronic pulses - in variants with or without switching outputs, with analog output and electronic or electromechanical display. Process devices are used for displaying, monitoring and scaling standard signals, temperature or strain gauge signals in any desired unit. All functions also with modular, 3-colour touch display.



	<b>HR47, HK07, Codix 13x</b>	<b>HW66</b>	<b>K07.20, Codix 92x, 57xT</b>	<b>Codix 534, Codix 565</b>
Characteristics	Hour meters for operating time measurement, service intervals, short time measurement	Energy and hour meter	Position acquisition, quantity and piece counting, length counter, rotary speed measurement	Flow measurement, pressure measurement, filling level display, weight monitoring, speed display, temperature monitoring
Applications	Pumps, vibrators, generators, compressors, small machinery, rollers, power sets, lighting	Dehumidifiers, generators and power sets	Fork lifts, cranes, armoring machines, pumps, disconnecting devices, saws	Compressors, pumps, motors, weighing devices, tank installations
Power supply	Battery, DC or AC	115 or 230 V AC	Battery, DC or AC	DC or AC
Protection level	IP65	IP65	IP65	IP65
Size [mm]	ø 58, 30 x 20, 48 x 24	48 x 48	30 x 20, 48 x 48, 96 x 48	48 x 24, 96 x 48
Measuring input	Time ranges: sec, min, h with resolution up to 1 ms	kWh and operating time measurement	Various counting and frequency modes up to max. 1 MHz	Scalable standard signal or strain gauge inputs, temperature inputs
Features	<ul style="list-style-type: none"> <li>High vibration and shock resistance</li> <li>Wide temperature range</li> </ul>	<ul style="list-style-type: none"> <li>High vibration and shock resistance</li> <li>Wide temperature range</li> </ul>	<ul style="list-style-type: none"> <li>High vibration and shock resistance</li> <li>Wide temperature range</li> <li>Switching and analog outputs</li> </ul>	<ul style="list-style-type: none"> <li>High vibration and shock resistance</li> <li>Wide temperature range</li> <li>Switching and analog outputs</li> </ul>

You will find further counters and process devices on our Internet website under [www.kuebler.com/counters](http://www.kuebler.com/counters)

# Technologies for Mobile Automation

Innovations from tradition. Kübler products benefit from 55 years experience in automation technology. Over time they have been further developed for use in the mobile automation. Small details make a big difference. Our products feature many intelligent topquality extras and offer our customers crucial benefits. In doing so they make a significant contribution to the high availability of the plant.

## Electrical interfaces



Kübler encoders boast a wide variety of interfaces. Along with incremental interfaces such as TTL / HTL there are also absolute interfaces such as CANopen and SAE J1939. The outputs and supply voltage are short-circuit protected.

The analog interfaces with current or voltage output allow very easy end position setting. This applies to draw-wire systems, singleturn and multiturn encoders, as well as for inclinometers.

## Robust bearings



Kübler encoders boast a very sturdy and robust bearing construction, brought together under the term Safety-Lock™.

Encoders with Safety-Lock™ have positive interlocked bearings with a large bearing span and special mounting technology. This means they are able to tolerate installation errors as well as large shaft loads, as can occur as a result of temperature expansion or vibration.

## Wide temperature range



High heat resistance – combined with high rotational speeds – make the Kübler encoders the optimal solution for all applications in a high temperature environment.

## Hardened down to the last detail



The durable construction that comes as standard, permits high shock and vibration values; these are both tested and certified. The values are extremely important in drive engineering, as the potential applications for the motors are highly diverse.

## Approvals

All encoders from the Kübler company carry the CE mark and are tested for electromagnetic compatibility and immunity to interference. As an option, our products can be UL approved.

Products with Ex approval and products certified for Functional Safety complete Kübler's products range.



## Shaft isolation



Even well-earthed machine housings and rotors of generators and large motors carry a shaft current on the rotor.

The equipotential bonding from the rotor to the stator via the encoder bearings leads to spark erosion and can damage the encoder. This can be remedied by isolating the encoder bearings. Isolating inserts can be used with all Sendix compact encoders.



## Redundancy



In order to increase the safety of the sensor signals and therefore the stability of the whole machine, sensors can be ordered with redundant output signals. The sensor electronics are doubled and deliver two equivalent signals. The position signals provided via CANopen or an analog voltage or current signal can be monitored and processed on two channels in the control.

## High protection level / seawater durable



A high protection level is achieved as a result of the integrated radial shaft seal. This, together with the wide temperature range and the bearing technology, ensures outdoor use is possible without problems. Many versions of the Sendix family of devices have 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.

## Energy Harvesting Technology



The magnetic encoders of the M36 family include the so-called Energy Harvesting Technology. This technology allows counting reliably the number of revolutions even in case of a power failure. The necessary energy is generated directly by the rotating magnetic field. The benefit is obvious: this technology allows doing totally without gear and without battery. In addition to enhancing the compactness and longevity of the encoder, this also increases cost-effectiveness, which plays a determining role in cost-sensitive applications.

## Safety-Lockplus™



Interlocked bearings, a large bearing span and extra-strong external bearings ensure stability in case of vibrations and robustness against installation errors. This prevents machine standstill and repair work. The proven Safety-Lock™ construction includes additionally a mechanically protected shaft seal.

## 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.

### **24ONE** 24one delivery promise

Manufacturing in 24 hours. For orders placed on working days before 9 AM, the product will be ready for dispatch on that same day. 24one is limited to 20 pieces per delivery.



### Sample Service

We manufacture samples of special designs or according to customer specification within shortest time.



### 10 by 10

We will manufacture and deliver 10 encoders within 10 working days (365 days a year - with the exception of 24th Dec. until 2nd Jan.)



### Technical Support

Kübler' applications team is present on site all over the world for advice, analysis and support.



### 48 h Express Service

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

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### Safety Services

- Adapted service packages
- Individual customer solutions



Mobile Automation

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