



Mobile automation solutions

- Incremental encoders
- Absolute encoders
- Linear measuring technology
- Counting technology



## Kübler pulses for the Mobile Automation. Efficient, from one hand.

Thanks to its wide product portfolio, Kübler meets all requirements of the Mobile Automation. For that purpose, we take advantage of now exactly 50 years experience in mechanical engineering and in automation technology. Magnetic and optical encoders with suitable interfaces, equipped with particularly robust bearings, the most up-to-date housing technologies and Functional Safety are part of our wide products range for heavy-duty applications.

Our skilled and process-oriented service and sales staff will support your search for the optimal solution. Kübler integrates components and offers complete systems for your displaying, measuring and control tasks, all from one hand.







## Application Examples

- Vehicles: Fire truck / Truck-mounted crane / Tower crane p. 4
- Automatic guided vehicles (AGV) / Industrial trucks / Telescopic forklifts p. 6
- Agricultural and forestry vehicles p. 8
- Construction machinery / Tunneling and mining p. 10



## Technologies and Products

- Technologies for the mobile automation p. 12
- Incremental and absolute encoders p. 14
- Linear measuring technology, inclinometers p. 15
- Counting and display technology p. 15

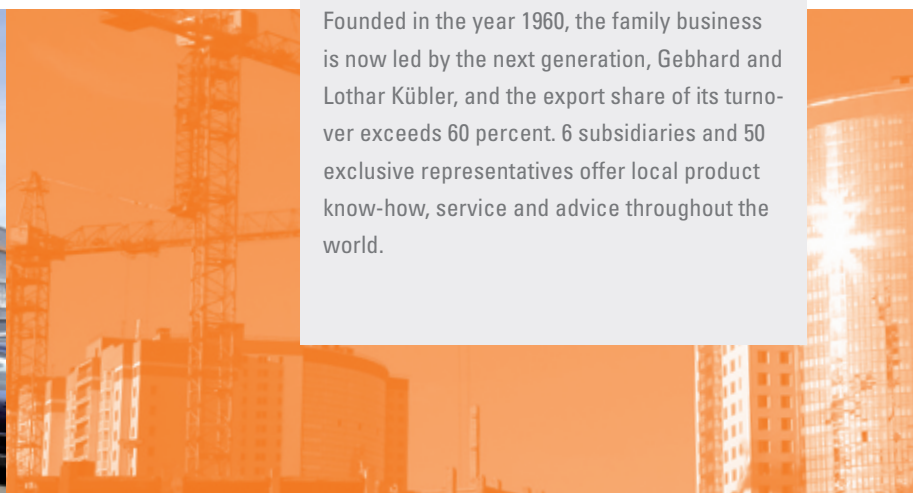


## Kübler Service

- Kübler Service for planning dependability p. 16
- Tailor-made solutions – Kübler Design System p. 17

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.





## Vehicles: Fire truck / Truck-mounted crane / Tower crane

Developed for increasingly tough requirements: Kübler encoders, draw wire systems 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 IP 67 protection ensures tightness in case of intensive outdoor applications. Sensors with IP69k protection can also be steam-jet-cleaned with the machine.

### 1 Ladder rotation / Ladder length



Outdoor use with humidity – High positioning accuracy  
– Field bus control

#### Sendix 5868

- CANopen Multiturn
- Safety Lock™ bearing structure, IP67
- Status display – Reset button
- Mechanical adaptations + gear



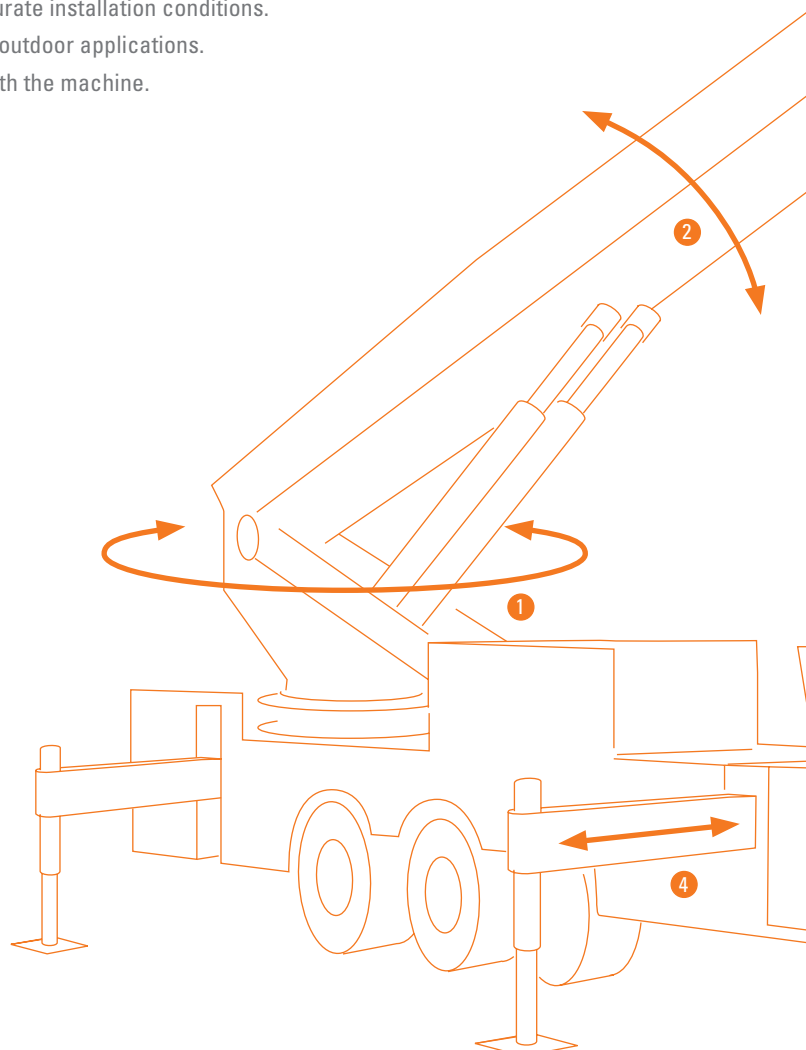
### 2 Ladder elevation angle



For an outdoor use with humidity – Absolute angle measurement with field bus control – Robust encoder requiring little space

#### Sendix M36

- 36 mm size
- CANopen interface
- Magnetic scanning
- Safety Lock plus™ with IP69K
- Status display





« With the optical incremental encoders from Kübler GmbH, we have acquired a truly rugged and reliable product. All technical adaptations were carried out and our wishes met in the shortest time, and the delivery dependability allows us fast alterations in our production. »

Manager Technology  
Austrian Customer



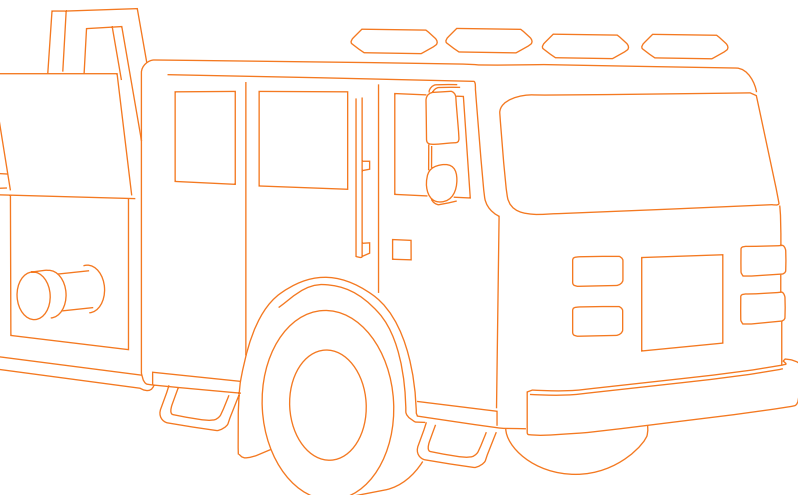
### 3 Horizontal basket position



Inclinometer with high IP protection requiring little space – dynamic repositioning

#### Inclinometer IS40:

- Analogue output
- IP 67, entirely compound-filled



### 4 Leg position



Linear measurement of the stroke up to 1.5 m – Accurate speed and position with a compact shape

#### Miniature draw wire system D5

- With optical incremental encoder
- Measuring length 2 m







## Automatic guided vehicles (AGV) / Industrial trucks / Telescopic forklifts

Compact encoders and draw wire systems of Kübler take in charge the determination of the speed, of the steering angle of the vehicles and of 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.

### 1 Driving speed



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

#### 2420 miniature encoder

- Incremental encoder  $\varnothing$  24 mm
- Operating temperature -20°C ... +85°C
- Accurate optical scanning



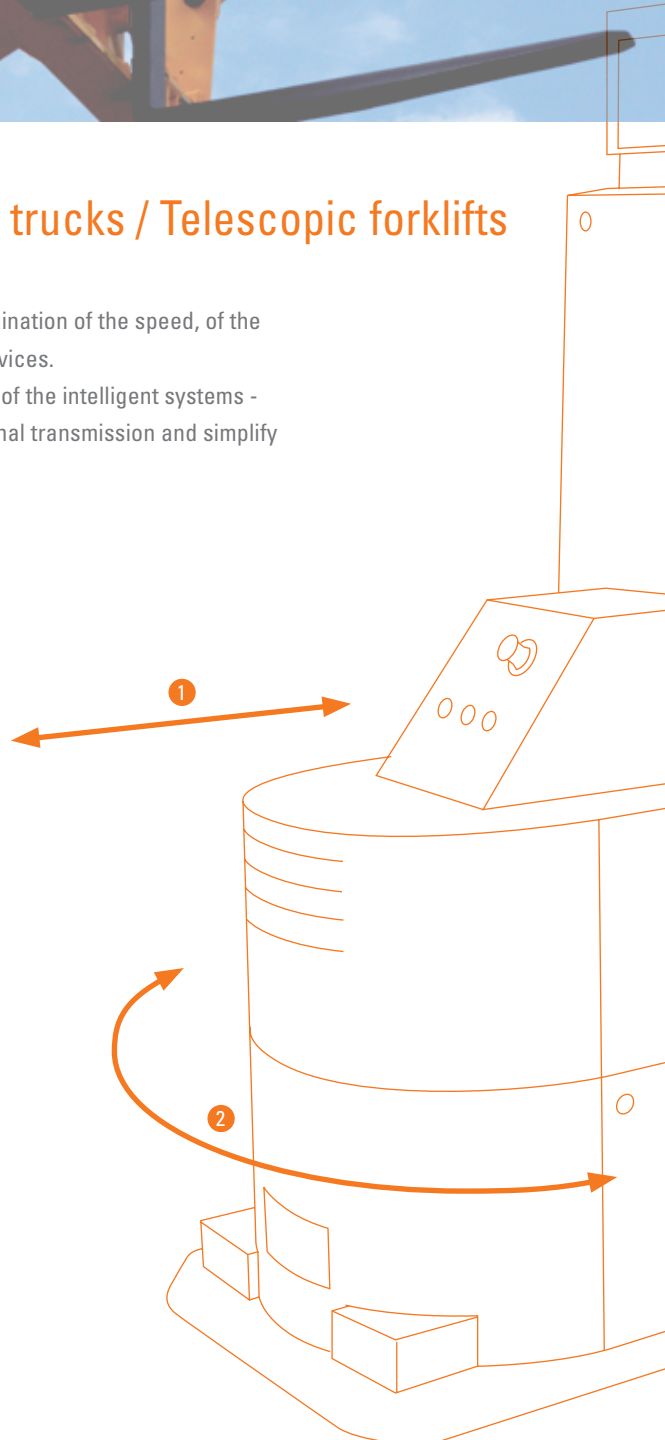
### 2 Steering angle monitoring

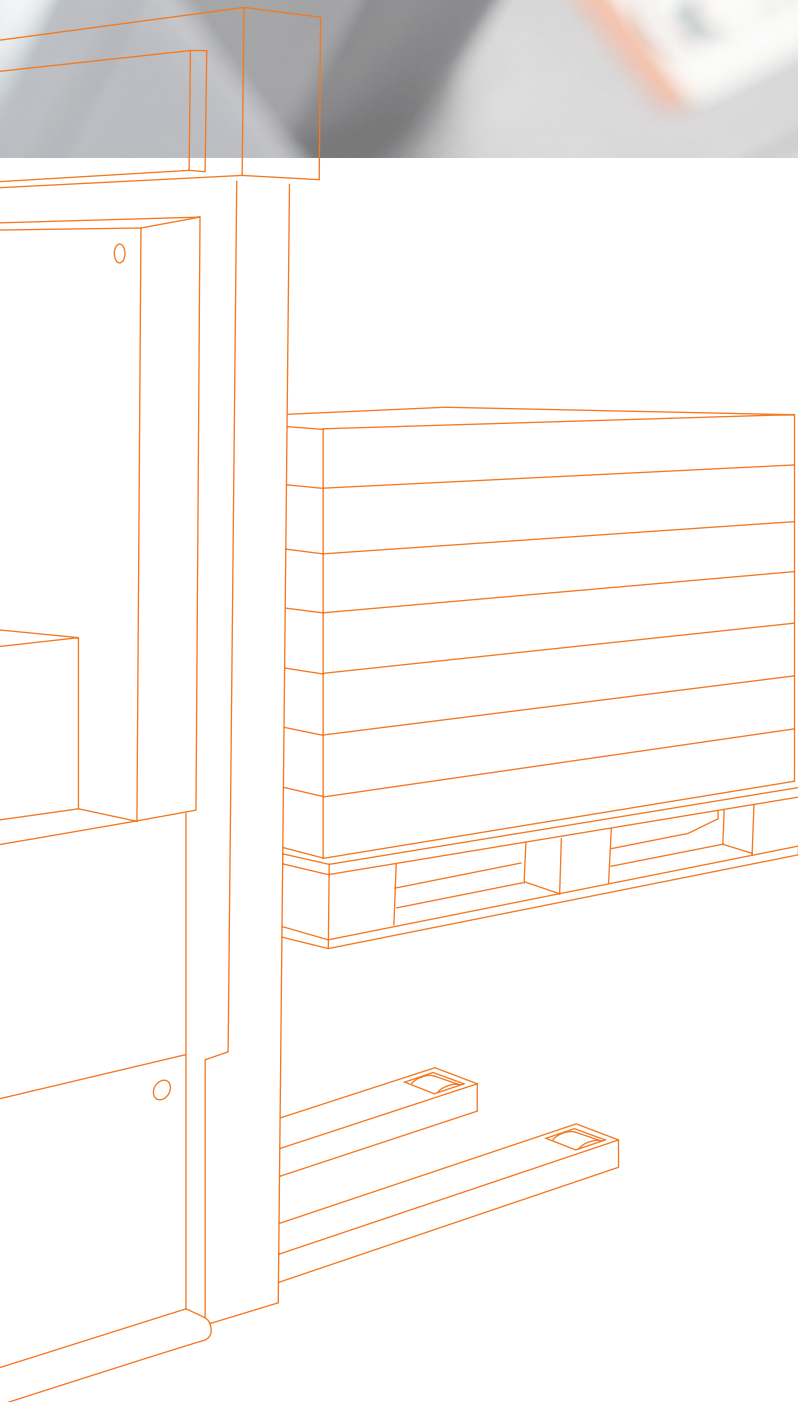


Absolute angle measurement with field bus control – Robust encoder – Reduced space requirements

#### Sendix M36

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





3

### Lifting height measurement



Linear measurement up to 6 m – Absolute value acquisition via field bus – High accuracy

#### Draw wire system C120

- Measuring length 6 m
- CANopen interface
- With optical multturn encoder
- Robust housing







## 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.

### 1 Saw blade setting angle



For an outdoor use with humidity – Absolute angle measurement with field bus control – Robust encoder requiring little space

#### Sendix M36

- 36 mm size
- CANopen interface
- Magnetic scanning
- Safety Lock plus™ with IP69K
- Status display



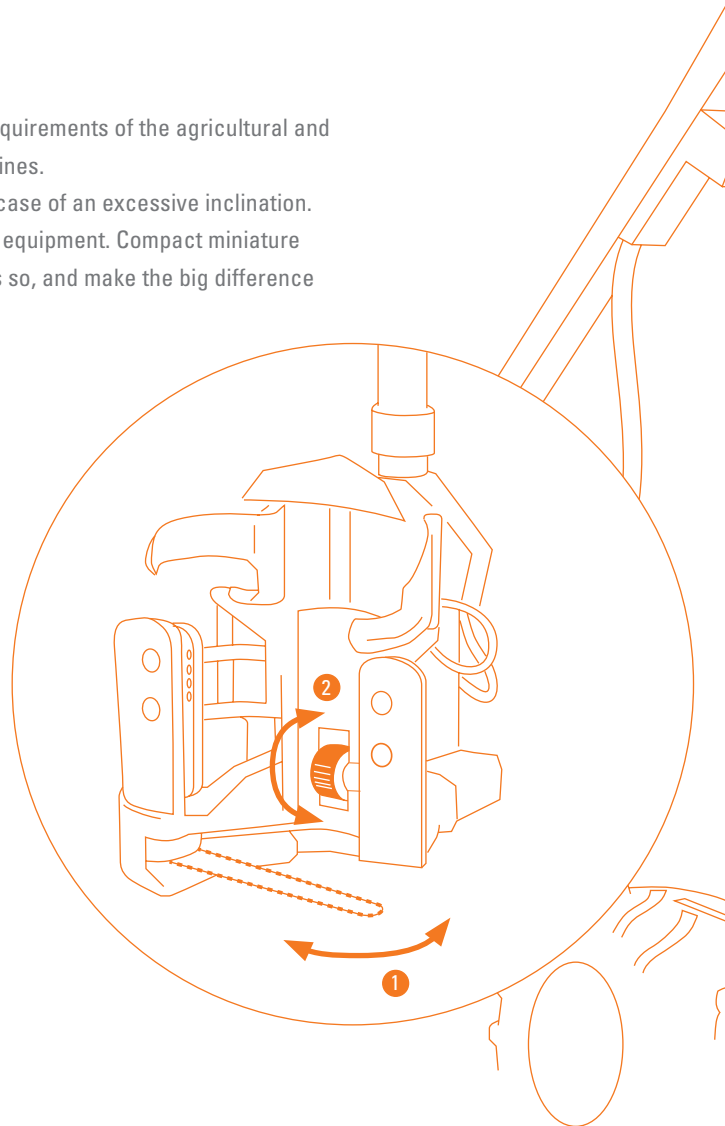
### 2 Feedrate and position



Trunk length measurement at the feed wheel – Dynamic rotational speed measurement requiring little space

#### 5000 Sendix incremental encoder

- Incremental encoder Ø 50 mm
- Operating temperature -40°C ... +85°C
- High shaft load: 40 N axial and 80 N radial

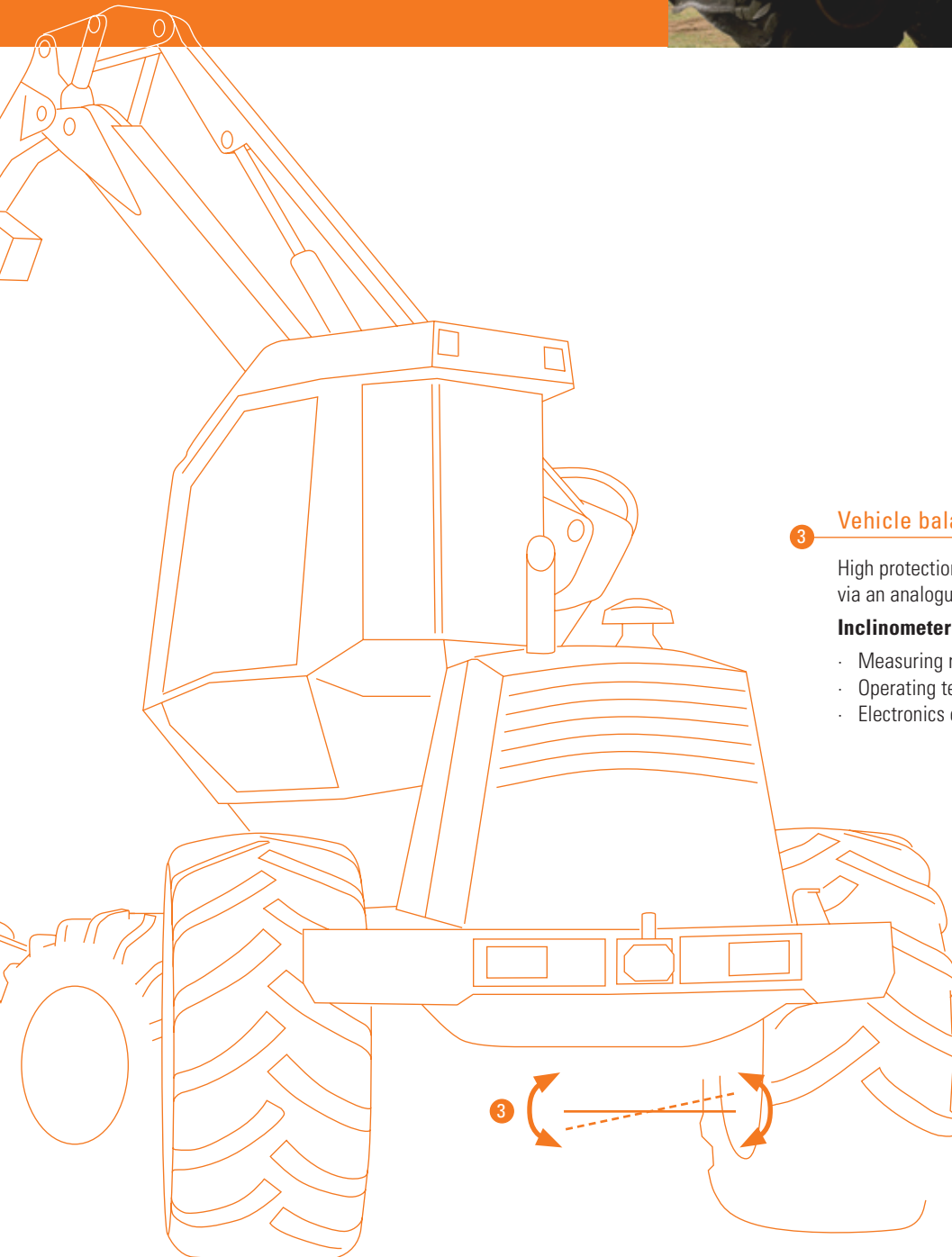






« I should like to thank you for your commitment over the duration of the whole project. In the future Kübler will be our N°.1 supplier when it comes to sensors. »

Manager Electric Design  
German Customer



### 3 Vehicle balance control

High protection against humidity – Dynamic balance display via an analogue value

#### **Inclinometer IS40**

- Measuring range  $\pm 30^\circ$  with a resolution  $\leq 0.15^\circ$
- Operating temperature  $-30^\circ\text{C} \dots +70^\circ\text{C}$
- Electronics entirely compound-filled with IP67 protection





## Construction machinery / Tunneling and mining

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

Rough positioning using analogue 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.

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

Outdoor use with humidity and dirt – High positioning accuracy – Field bus control

#### Sendix 5868

- CANopen multiturn
- Safety Lock™, IP67
- Status display – Reset button
- Measuring pinion on the encoder shaft

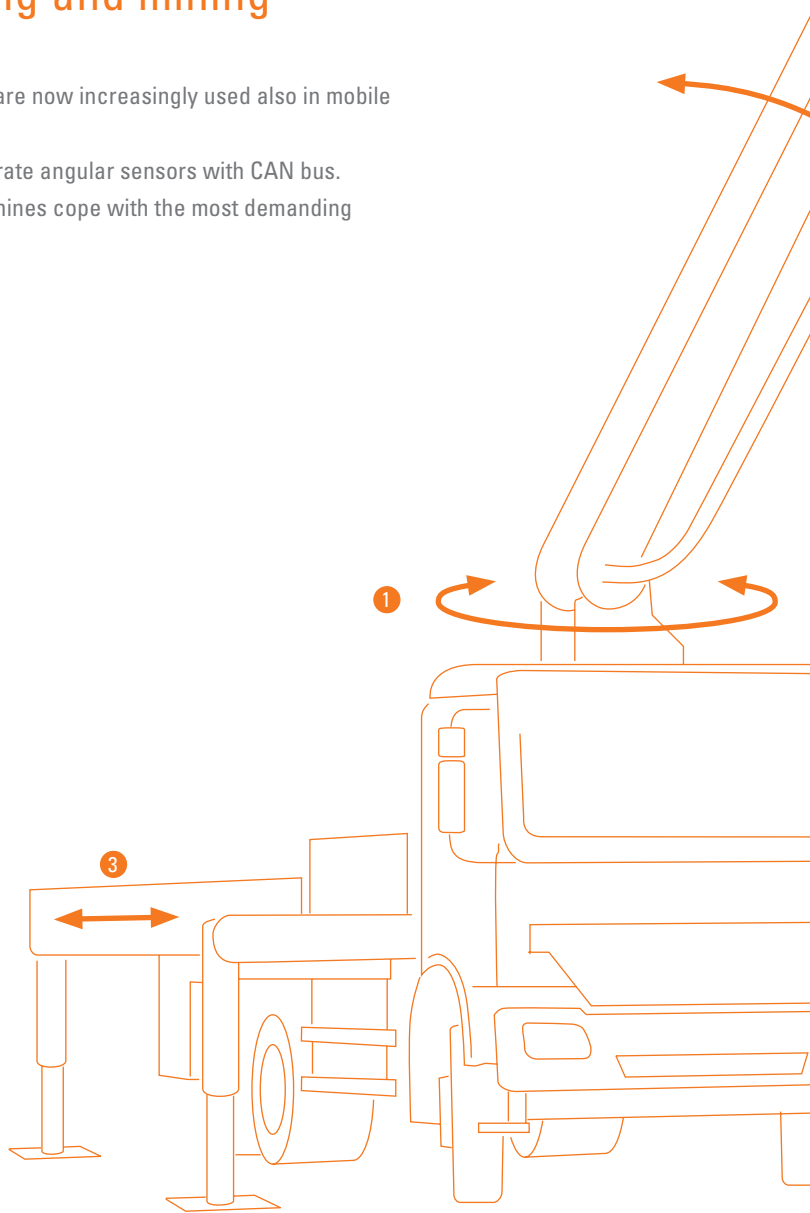


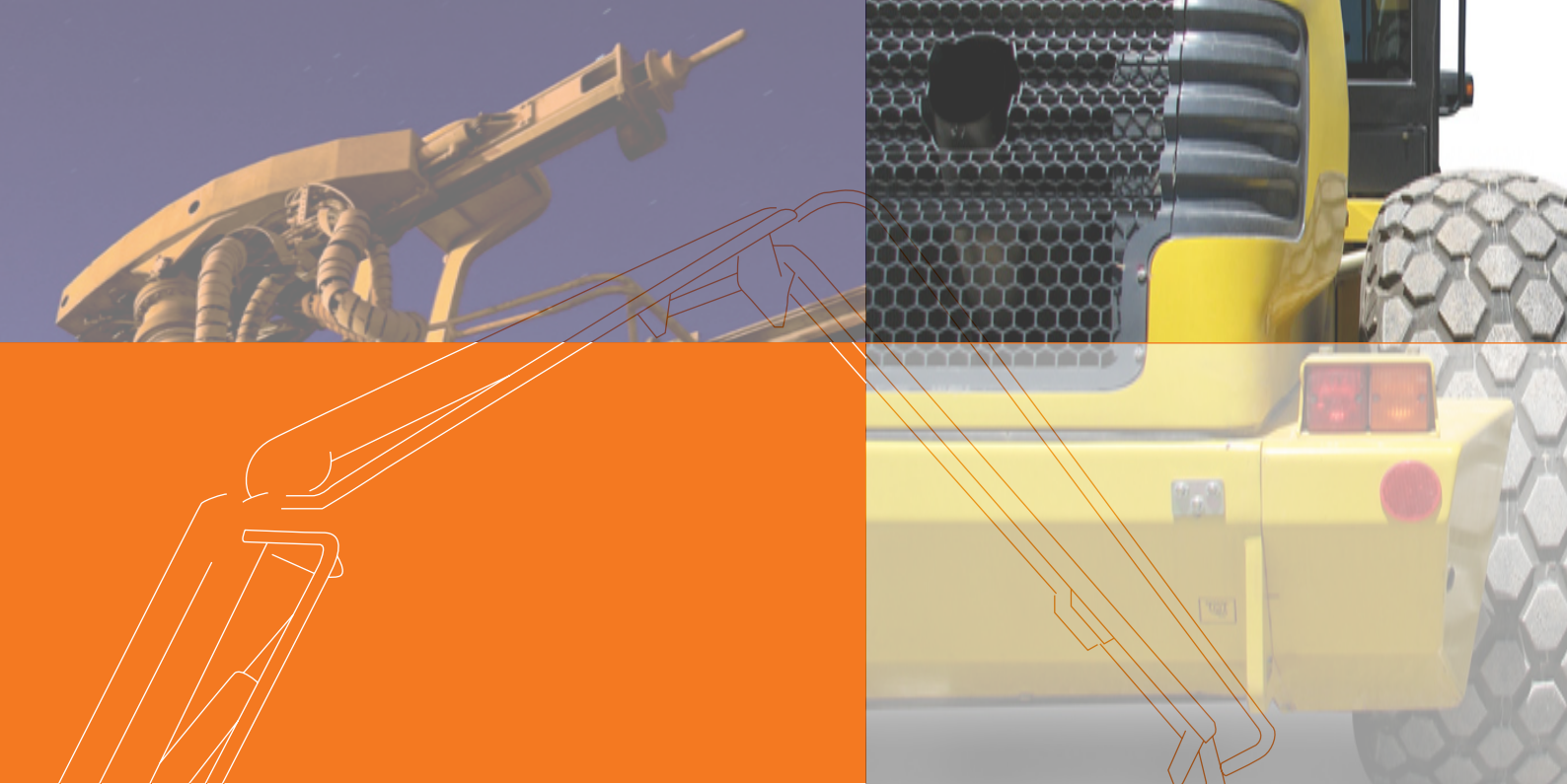
### 2 Elevation angle of the concrete distribution mast

Extreme resistance against external agents – Absolute singleturn angle measurement with field bus control – Robust encoder requiring little space

#### Sendix M36

- 36 mm size
- CANopen interface
- Magnetic scanning
- Safety Lock plus™ with IP69K
- Status display





2

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### Leg position



Position measurement of the telescopic leg - Linear measurement of the stroke up to 3 meters – Speed and position control via BUS interface - Compact shape

#### Draw wire system B80

- With optical absolute encoder
- Measuring length 3 m
- Mounting with 2 screws
- Operating temperature range: -20°C ... +90°C







## Technologies for the mobile automation

Innovations from Tradition. Kübler products benefit from 50 years experience in automation engineering. Over the years they have undergone ongoing development and been optimized for use in drives, in outdoor and offshore applications and for use in mobile machinery.

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 and safety of the machines.

### Robust bearing units for tough applications

Encoders mounted on construction machinery are subjected to particularly strong mechanical stresses.

This is why the Kübler Sendix encoders are equipped with a very stable bearing construction in Safety-Lock™ design. This includes very large double ball bearings which are in addition blocked mechanically. The distance between the two bearings has been made as large as possible, so as to allow for space for an extra-strong external bearing. This design allows standing even highest stresses.

In addition, the bearing unit of the magnetic encoders of the M36 series have – with the Safety-Lock plus™ design – a mechanically protected shaft seal and a labyrinth seal, ensuring optimal protection against the effect of steam or water jet cleaning, but also against stone-chipping.

### 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 an outdoor use without any problem. The die cast housing has a very strong base, on which the connector flange is fastened with four screws.

The Sensor-Protect™ design of the M36 encoders allows, thanks to entirely compound-filled electronics, the highest protection, IP69k. Thanks to the separate mechanical components with mechanically protected shaft and labyrinth seals, no additional protection is required in case of steam or high-pressure cleaning.



«The test devices have successfully passed the tests and can thus be installed without any modification. I think that is a real success, which shows just how well-engineered and high-quality your devices are.»

Manager Product Marketing, US Corporation



Safety-Lock™



High shaft load capacity



Shock / vibration resistant



Seawater-resistant optional



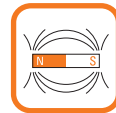
High IP value



Temperature



Magnetic field proof



Magnetic sensors



Optical sensors

### Optical and magnetic sensor technology

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

Optical encoders achieve a very high accuracy and resolution (up to 17 bits singleturn and 41 bits multiturn). They are used for long strokes or automatic positioning.

### Salt water-resistant

For use in areas subjected to road salt:

The devices are certified according to IEC 68-2-11 for their resistance against the effects of salt spray for a duration of up to 672 hours – the highest test level.

### Available with SIL3 certificate

Safety is - not least since the new EU Machinery Directive - an „integral part of the construction of any machine“.

Sendix SSI absolute encoders, with an additional Sin/Cos incremental output, and Sin/Cos versions of incremental encoders are available with the SIL3 certification. But safety goes further than this: safe components are characterized by a robust and reliable interface and by a particular ability to cope with high mechanical and electronic loads.

Thanks to their design optimized for safety, the Sendix encoders make a significant contribution to the high availability of vehicles and machines.



## Encoders, Linear Measuring Systems, Inclinometers, Counting Technology

As a leader in the area of counting and sensor technology with half a century of market experience, Kübler offers a wide products portfolio.

Our customers take advantage of our founded technological and area-related competence with clear concepts – always focused on innovation and product optimization. Complete solutions, customer-specific products and systems are part of our specialties.

### Incremental encoders

- Miniature encoders (24 mm), for small mounting spaces
- Measuring systems without bearing, with magnetic rings, mounting depth only 16 mm
- Robust universal encoders of the Sendix series with a resolution up to 5000 pulses/revolution.
- Encoder with large hollow shafts, up to  $\varnothing$  42 mm

### Absolute singleturn and multiturn encoders

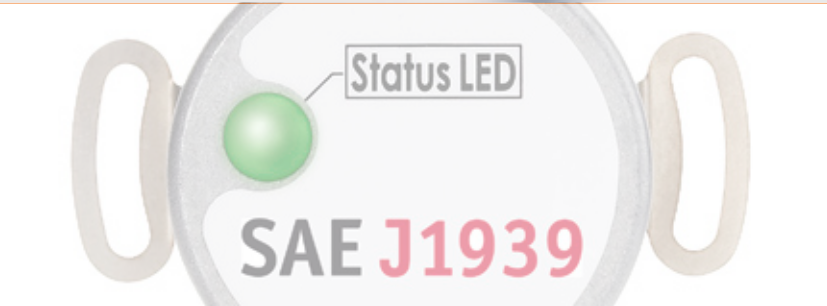
- Miniature singleturn encoders with a 24 mm diameter, for small mounting spaces
- Robust singleturn encoders with a 36 mm diameter, with IP69k protection and e1 certification
- Compact high-accuracy singleturn and multiturn encoders in the 36 mm format
- Universal singleturn and multiturn encoders,  $\varnothing$  58 mm
- Encoder with large hollow shafts, up to  $\varnothing$  28 mm

### Field bus singleturn and multiturn encoders

- Robust singleturn encoders with a 36 mm diameter, with IP69k protection (CANopen or SAEJ1939 interface)
- Compact high-accuracy singleturn and multiturn encoders in the 36 mm format (CANopen)
- Universal singleturn and multiturn encoders in the 58 mm format (CANopen, Profibus, DeviceNet, Ethercat and many other interfaces)
- Encoder with large hollow shafts, for shaft diameters up to 28 mm (CANopen, DeviceNet and Profibus)







### Linear measuring system

- Tough draw wire sensors Limes for measuring lengths up to 40 m with analogue, incremental, SSI or field bus interfaces
- Easy to install compact measuring systems Limes with encoded magnetic tapes – contactless, insensitive to dirt

### Inclinometers

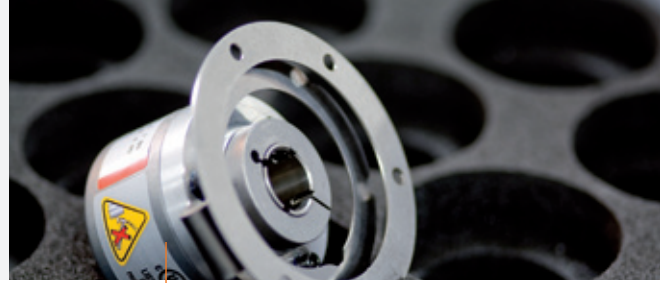
- Particularly compact and easy to install
- Simple to install, M12 connecting technology
- Measurement of two-dimensional inclinations selectable in the measuring areas 10, 45, 60° (resolution 0.05° ... 0.15°)
- With analogue or CANopen interface

### Pulse counters and hour meters

- The classic device for construction machinery: round electromechanical hour meter HR47 with run indicator
- Micro pulse counter and service hour meter
- Compact LCD displays Codix 13x, DIN 24 x 48 mm format, battery-powered
- Large multifunction display Codix 54x with very bright LED display, DIN 48 x 96 mm format

### Simple controls using preset counters

- Multifunction preset counter Codix 924 with up to 6 presets, for the simple control of pulses, time, speed and position
- Position and differential preset counter 572 for connecting 2 sensors (2 encoders or 1 encoder and 1 proximity switch), with 4 programmable control outputs – ideal as totalizer-position display for multi-stage hydraulic cylinders, for monitoring torsion, shafts or gear breakage or as a differential position monitoring device of 2 positioning units



## 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.



### 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:

Kübler GmbH, Germany	+49 7720 3903-35
Kübler France	+33 3 89 53 45 45
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



### 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. »

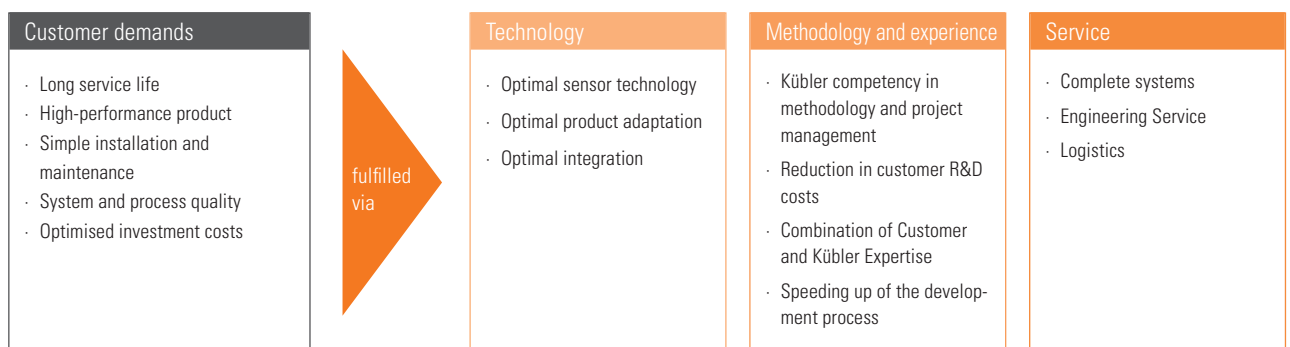
*Purchasing Manager, German Producer of Geared Motors*

## 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:

### 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**



Mobile Automation

[www.kuebler.com/mobile-automation](http://www.kuebler.com/mobile-automation)

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