Kübler

Enter a New Age of Absolute Encoders: Singleturn, Multiturn and Fieldbus.

SSI · BiSS INTERFACE · PROFIBUS PROCESS FIELD BUS · CANopen · CANopen LIFT · EtherCAT Technology Group

RoHS · c UL us · Ex 2/22

Sendix® absolut

- Safer
- Faster
- More versatile

pulses for automation

Technological Expertise for a New Age of Absolute Encoders

Absolute Encoders from Kübler – Solutions with Added Value

Absolute singleturn and multiturn encoders have established themselves today as the standard method for measuring linear displacement or angular position. With absolute encoders a reference trip is no longer needed after a system start-up or a power-down. Multiturn encoders in particular are now being employed, where previously incremental encoders had predominated, for example with geared motors or in lifts.

Today all manner of multiturn encoders are available in a variety of designs. As a rule the manufacturers offer either mechanical gears for "counting turns", or swear by electronic counters with electronic data storage. They are critical of any other technology.

The fact is however: it is not a case of which is better or worse; each technology has its advantages and drawbacks. Only the actual application can decide.

With the new range such discussions are a thing of the past. Kübler is now in a position to offer both gear technologies.

The new SENDIX absolute family comprises a highly integrated mechanical gear in conjunction with purely optical sensor technology, not influenced by magnetic fields, and with no battery. Even through hollow shafts up to 14 mm are manufactured using this gear. The new encoders are particularly fast absolute encoders that supply position data in real time. They can be used for control tasks as well as for positioning.

The already-existing Kübler ranges have electronic gearless technology, which results in them being especially space-saving.

Result: The customer can choose according to his application and thus receives from Kübler the ideal product for his needs.

Lothar Kübler on the development of the Kübler absolute encoder range

"In recent years Kübler has evolved as the solution-oriented leader in the field of absolute encoder technology.

Already back in 1997 Kübler introduced the first absolute encoder with through hollow shaft – a world first at that time. Constant innovations such as Integrative Technology or Intelligent-Sensing-Technology were to follow and made new applications and customer solutions for absolute encoders possible.

Minimal installation depths or shock resistance up to 250 g are impressive proof of the benefits of our technology.

Lothar Kübler,
Joint Managing Director of Fritz Kübler GmbH

Gebhard Kübler on the new Sendix absolute encoder family

"With the new Sendix Absolute Series we are entering a new age in absolute encoder technology. Our vision of building absolute encoders that are "faster", "safer" and "more versatile" than previously available in the market has now become a reality. At the same time we are the only manufacturer that can offer both electronic and mechanical gear technologies. "

Gebhard Kübler,
Joint Managing Director of Fritz Kübler GmbH

pulses for automation

Safer:

Sendix® absolut

Trouble-free positioning and production with the new Sendix absolute encoders from Kübler. An ingenious safety concept together with particularly reliable technology put an end to expensive downtime caused by encoder failures

Alarm & Warning concept: (Condition Monitoring)
Status display by LED or via interface, for monitoring of sensor, voltage and temperature.

Optical display of operational status on the fieldbus by means of 3 LEDs.

High Tech Multiturn Gear Module

Multiturn gear module developed from special materials, first stage with double bearing layer and specially developed gear teeth. We benefit from our 40 years experience of precision mechanics in the construction of micro counters.

- Allows for a combination of high rotational speed up to 9000 rpm, minimal wear and high temperatures, as well as – for the first time – through hollow shafts up to 14 mm and a 15 mm blind hollow shaft in the industry-standard 58 mm format

For applications with severe electromagnetic interference (e.g. magnetic brakes on geared motors)

Singleturn and multiturn, exclusively with optical sensor technology. No components that can be affected by magnetic fields.

- Absolutely safe operation even in areas with strong magnetic fields, e.g. magnetic brakes

Particularly rugged mechanical construction

Sturdy bearing construction
Safety-Lock™ Design

IP 67

- 40° + 90°

- Eliminates machine downtime and repairs.
- Interlocked bearings, large bearing span and extra strong outer bearings ensure stability when subjected to vibration.
- Ideal for use outdoors thanks to its solid die-cast housing and radial shaft seal. The Sendix benefits from a high IP 67 protection rating and a wide operating temperature range from -40°C up to +90°C.
- Slotted hollow shaft ensures precision centring.

Highly-integrated electronics

Kübler OptoASIC technology with very high integration density (Chip-on-Board)

- Low number of components and bonding sites increases the reliability in the application

Faster:

Positioning and control in real-time with the ultra swift absolute encoders from Kübler: the new Sendix absolute encoder generation allows fast updates and data transmission with SSI, Fieldbus and the new all digital BiSS interface

Interfaces:

SSI

BiSS INTERFACE

Fieldbus interfaces:

PROFIBUS

CANopen

CANopen LIFT

EtherCAT Technology Group

and more in preparation...

SSI and BiSS interface: Very high clock frequency

Clock frequency with SSI up to 2 MHz, with BiSS up to 10 MHz	high productivity thanks to short control cycles
	Open interfaces create flexibility and independence

Very short control cycles

Update rate of the total position of over 100 kHz with a max. jitter of 1µs	Possible to achieve particularly high accuracy in the application
Incremental outputs SIN/COS	Can be used in applications, which require a high resolution feedback system in real-time, e.g. gearless drives

Fieldbus interfaces CANopen / CANlift

Extended CAN Synch mode with real-time position detection	Genuine time-synchronous position detection of several axes
Intelligent functions such as transmission of speed, acceleration or leaving of an operating range	Fast data availability with reduced loading on the bus and controller
Event, Cyclic or Remote mode	The bus is only loaded when it is really needed – the user decides
Starting behaviour possible directly in Operational Mode	No delays during start-up
Preset position can be set dynamically whilst operation is running	Referencing without stoppage losses

More versatile:

Sendix® absolut

Quick, easy start-up: the unique modular concept from Kübler allows for an undreamt of array of versions with the minimum amount of time and expense

A big family:

Hollow shaft
Solid shaft
IP 65
IP 67
SSI
BISS
SIN/COS
CANopen
CANlift
Profibus
EtherCAT
Further Real Time Ethernet
M23
M12
Cable
Sub D
Permanent connection
Bus cover

Sendix® absolut

Mechanical Multiturn module

Singleturn Sensor

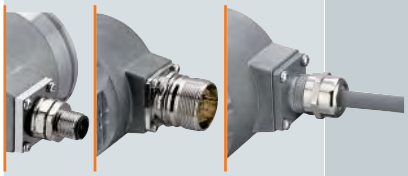
Global innovation:

First 58 mm industry-standard multiturn encoder on the market to incorporate a mechanical gear and permit a through hollow shaft up to 14 mm or a 15 mm blind hollow shaft. This allows for direct mounting on larger diameter standard shafts.

Versatile solutions for quick installation

Extensive choice of proven mounting options → Reliable installation in a wide diversity of mounting situations

M12, M23 plug connectors or cable connection → The right type of connector to suit every application



Reset via control input or SET-key → Quick, simple on-site start-up

→ CANopen and CANlift: Possibility to reset the encoder after incorrect programming (Version with SET-key)

A wide variety of Fieldbus functions

SSI, BiSS: additional incremental track TTL or with SIN/COS 2048 pulses → Positioning and speed monitoring with just one device

Fieldbus interfaces with the most up-to-date profiles → Up-to-the-minute fieldbus performance in the application

Fieldbus interfaces: easy programming of the resolution and the total measuring range → Fast start-up and a wide variety of possible applications

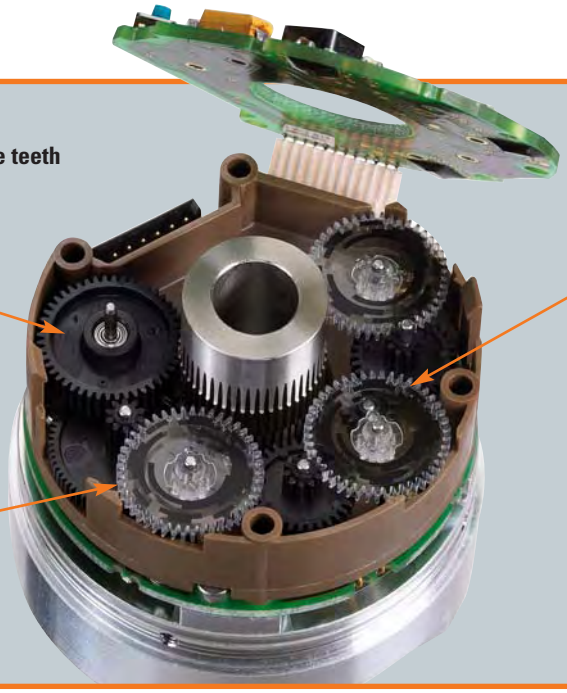
CANopen: PDO mapping of variables in the memory → Whether position, speed, acceleration or operating range – the user decides, which information is available in real-time

CANopen: Node address, baudrate and termination programmable via the bus → Fast, error-free start-up – no need to set switches

CANlift: two independent virtual devices are available → A wide comprehensive range of functions simplifies the design of the system

The Technology in Detail:

A New Age of Sendix Absolute Encoders



The multiturn gear module – armed to the teeth (12 Bit resolution)

First stage with double bearing layer

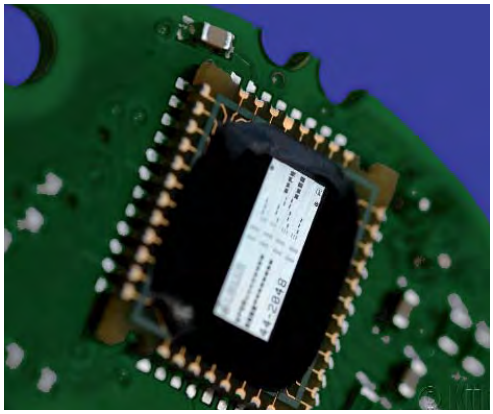
Specially developed gear teeth allow for very high rotational speeds and eliminate wear. Purely optical scanning technology. Completely resistant to magnetic fields.

Special materials ensure temperature stability and long service life

Heart of the sensor with Kübler ASIC technology
High Tech on 25 mm²
The high integration leads to:

- low susceptibility to interference and temperature
- high degree of ruggedness and less bonding sites
- considerably fewer discrete components

Kübler sensor technology allows for singleturn resolutions up to 17 Bit. SIN/COS signals with up to 8 Bit interpolation (internal), integrated transmitter, temperature and error monitoring



Fast Interface Technology

SSI Interface

Suitable for position and feedback
Clock frequency 50 kHz – 2 MHz for fast positioning
optional SIN/COS output

BISS

The BiSS Interface is an open, non-proprietary interface

- BiSS – up to 10 MHz clock frequency, bi-directional: can be configured via the controller
- Fully digital = interference-free feedback
- 26 Bit transfer possible in less than 5 µs, can be used in many instances for feedback control and can in part also replace the sine/cosine channel
- Multicycle data e.g. temperature information, warnings
- Warning-Alarm discrimination
- CRC data backup
- Same physical characteristics as SSI

CANopen, CANlift,
Profibus

Real time Ethernet:
EtherCAT (in preparation), Profinet

The Sendix Absolute Family:

Sendix® absolut

An array of products unique in the world

	Singleturn					Multiturn			
	5853	5873	5858	5878		5863	5883	5868	5888
Interface	✗	✗			SSI	✗	✗		
	✗	✗			SSI + SIN/COS-track	✗	✗		
	✗	✗			SSI + incremental track	✗	✗		
	✗	✗			BISS	✗	✗		
	✗	✗			BISS + SIN/COS-track	✗	✗		
	✗	✗			BISS + incremental track	✗	✗		
			✗	✗	CANopen			✗	✗
					CANlift			✗	✗
			✗	✗	Profibus DP			✗	✗
			❍	❍	EtherCAT			❍	❍
Mechanical	10 mm	-	10 mm	-	Shaft max.	10 mm	-	10 mm	-
	-	-	-	15 mm	Blind hollow shaft max.	-	15 mm	-	15 mm
	-	15 mm	-	-	Through hollow shaft max.	-	14 mm	-	-
Performance characteristics	12000	9000	9000	9000	Max. speed rpm	12000	9000	9000	9000
	✗	✗	✗	✗	Set-key (optional)	✗	✗	✗	✗
	✗	✗	✗	✗	Status LED (optional)	✗	✗	✗	✗
	-40° C	-40° C	-40° C	-40° C	Temp. min.	-40° C	-40° C	-40° C	-40° C
	+90° C	+90° C	+80° C	+80° C	Temp. max.	+90° C	+90° C	+80° C	+80° C
	67	67	67	67	IP max.	67	67	67	67
	17 bit	17 bit	16 bit	16 bit	Resolution max.	29 bit	29 bit	28 bit	28 bit

✗ = available as standard product
❍ = in preparation

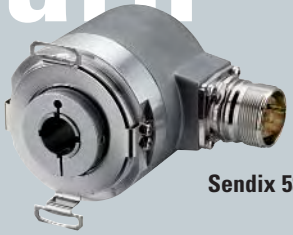
Sendix 5853

Sendix 5863

Singleturn

Multiturn

Sendix 5873



Sendix 5883

Sendix 5858

Sendix 5868

Sendix 5878

Sendix 5888

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Mechanical characteristics

Max. speed:	12000 min^{-1}
Max. protection:	IP 67
Temperature range max.:	- 40° C ... + 90° C
Through hollow shaft max:	to 15 mm
Connections:	M12, M23, cable, radial and axial
Fieldbus encoders:	with bus cover and one or two permanent connections (point to point)
Shock resistance to DIN-IEC 68-2-27	>2500 m/s^2, 6 ms
Vibration resistance to DIN-IEC 68-2-6:	>100 m/s^2, 55…2000 Hz

Electrical characteristics and interfaces

Resolution:	Singleturn to 17 Bit Multiturn to 29 Bit
Supply voltage:	5 V DC ± 5 % or 10…30 V DC
Current consumption:	5 V DC: max. 70 mA, 24 V DC: max. 20 mA
SIN/COS outputs for SSI/BiSS*	1 Vpp ± 20 % 2048 divisions
Update rate:	100 kHz, Jitter < 1 µs
SSI interface	For extremely fast positioning tasks with deterministic behaviour 50 kHz ... 2 MHz
Data refresh:	To 14 bit ST (x 12 bit MT), Jitter < 1 µs 15 – 17 bit ST (x 12 bit MT), Jitter ☒ 4µ s
BiSS interface:	Clock rate to 10 MHz bi-directional, configurable by controller
Fieldbus Profibus	Profibus DP-V0 Encoder Profile V1.1
Fieldbus CANopen	Communication Profile V4.02 Encoder Profile DS 406 V3.1
Fieldbus CANlift	Profile DS 417 V1.1

Would you like to know more about the new Absolute Encoder technology platform?

www.kuebler.com

Or request data sheets now
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pulses for automation

Encoders, Linear Measuring Systems + Connection Technology

Counting Technology

Process Technology

OEM Products and Systems

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