Kübler

SIL3 Functional Safety PLe

Encoders for Functional Safety

- Incremental Encoders
  Sendix 5814SIL / 5834SIL
- Absolute Encoders
  Sendix 5853SIL / 5873SIL
  Sendix 5863SIL / 5883SIL

pulses for automation

Functional Safety

Compliance with Safety Standards

According to DIN EN 13849-1 and DIN EN 61800-5-2 up to SIL3/PLe/Kat.4 the following safety functions can be implemented with the encoder:

SS1: Safe Stop 1 – controlled braking, STO after time or standstill
SS2: Safe Stop 2 – controlled braking until SOS
SOS: Safe Operating Stop – safe operating stop in position control
SLS: Safe Limited Speed
SLI: Safe Limited Increment of Position
SLP: Safe Limited Position
SSR: Safe Speed Range
SDI: Safe Direction
SSM: Safe Speed Monitoring

Encoders for Functional Safety

Safety is – not least since the EU Machinery Directive 2006/42/EG – an "integral part of the construction of drives". When choosing the right encoder for functional safety the principle applies that safety is achieved through the intelligent combination of encoder, controller and actuator.
Sendix SSI absolute encoders, with an additional Sin/Cos incremental output, and Sin/Cos versions of incremental encoders are available with certification. But safety goes further than this: safe components are characterised by a robust reliable interface and by the ability to cope with high mechanical and electronic loads.

BG-PRÜFZERT
BGIA 0904040
Sicherheit geprüft
tested safety

Safe Incremental Encoder Function

In order to achieve safe incremental information with the encoder, the controller must monitor the validity of the analogue, 90° phase-shifted sine/cosine signals with the help of the function: $\sin^2 + \cos^2 = 1$

Safe Absolute Encoder Function

In order to obtain safe information with the encoder regarding the absolute position, the controller counts the incremental pulses and compares the result with the absolute positions also provided by the encoder.

Safe mechanical connection

A 100% reliable mechanical connection is required for a safe function in the applications. Suitably sturdy fixing elements can help eliminate the risk of faults.

Multitalented device:

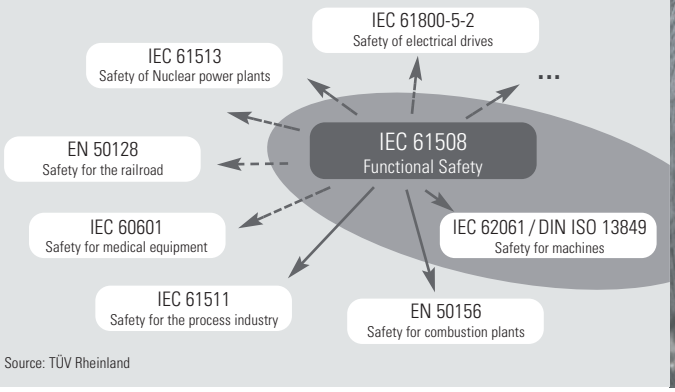
Absolute encoder with incremental sine/cosine signals, multiturn stage and integrated functional safety

Drive control using incremental sine and cosine signals is a tried-and-tested technology with a number of advantages. The high interpolatability of the analogue sine and cosine signals, with more than 1 million steps per revolution, allows for precise control of both slow turning as well as highly dynamic drives.

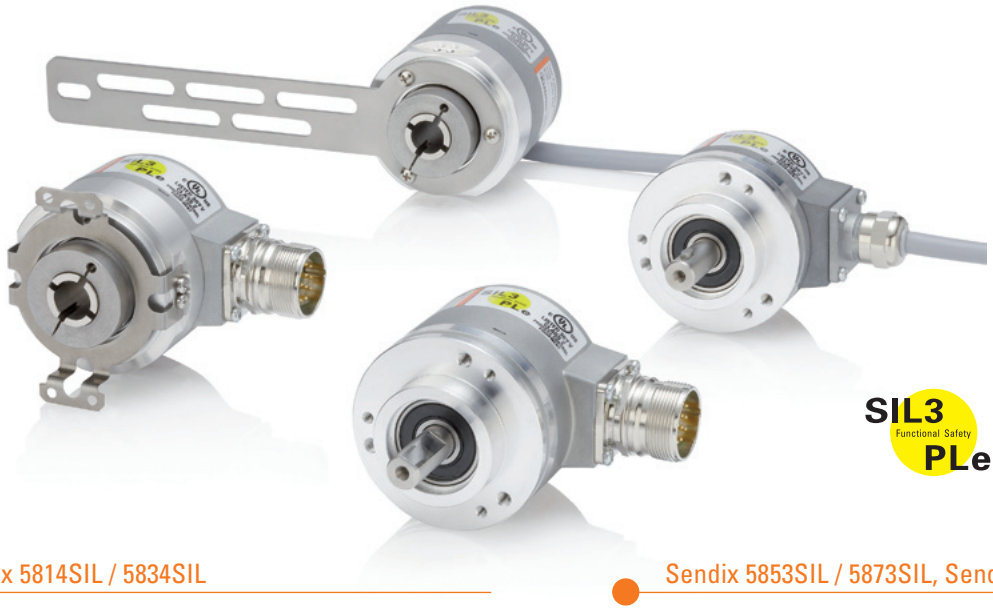
Combined with the high resolution and very accurate position information provided by the absolute encoder, all the data necessary for a precisely controlled motor start-up with an encoder is available. Furthermore, the multiturn sensor technology permits position control over a wide range.
And finally, the high information content of the signals – all independent of one another – forms the basis
for a sensor with high functional safety.

«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



Source: TÜV Rheinland



Sendix 5814SIL / 5834SIL

Incremental encoders with Sin/Cos outputs

The incremental position of the encoder family 58x4SIL is provided in the form of an analogue sine/cosine signal; here the resolution per revolution is 1024 or 2048 sine/cosine periods.

Additional features:

- With protected Safety Lock™ Technology: interlocked bearings for a high degree of ruggedness, accuracy and long service life.
- Protection rating IP65 or IP67
- Magnetically insensitive due to optical scanning.

Sendix 5853SIL / 5873SIL, Sendix 5863SIL / 5883SIL

Absolute encoders single and multiturn with SSI and Sin/Cos outputs

The absolute position of the encoder family 58x3SIL is transmitted in the form of a digital SSI or BiSS data word. With the singleturn variants 5853SIL and 5873SIL the resolution is between 10 bits and 17 bits, depending on the variant.

In contrast to the singleturn variants 5853SIL / 5873SIL, the multiturn variants 5863SIL / 5883SIL have in addition a gear for detecting positions greater than 360°. The number for detecting the revolutions amounts to 12 bits. This thus gives a total resolution for the multiturn of up to 29 bits.

The incremental position is provided in the form of an analogue sine/cosine signal. The resolution per revolution is 1024 or 2048 sine/cosine periods.

Additional features:

- Interlocked bearings for a high degree of ruggedness, accuracy and long service life.
- Protection rating IP65 or IP67
- Magnetically insensitive due to optical scanning.

MTTFd Values

With regard to the requirements of the Machinery Directive 2006/42/EC the MTTFd values for the most important standard encoders from Kübler are also provided.

This thus enables the user to carry out his own calculations according to DIN EN 61800-5-2 and DIN EN ISO 13849.

www.kuebler.com/safety

Fritz Kübler GmbH
Zähl- und Sensortechnik
Schubertstrasse 47
D-78054 Villingen-Schwenningen
Germany
Phone +49 7720 3903-0
Fax +49 7720 21564
info@kuebler.com
www.kuebler.com

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R.600.950.001 05 200 11 ES