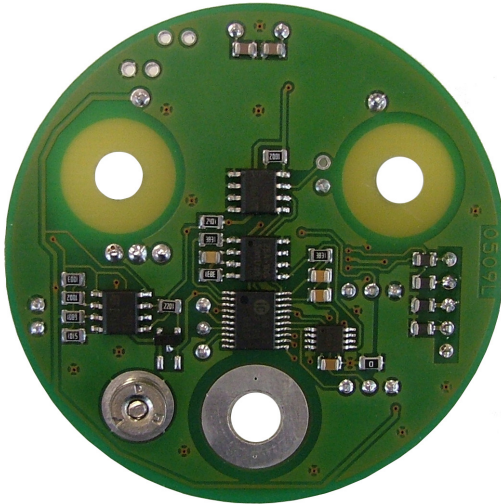


# Single and multiturn rotary encoder construction set TKN with CANopen interface

Document No.: TKN 12638 DE

Date: 04.01.2013



- Contactless, wear-free sensor system according to the Hall principle
- CANopen interface according to CiA, Device Profile for Encoders DS 406
- Model TKN: construction set consisting of printed circuit board and magnet
- Resolution: 4096 steps / 360° (12-bit)
- Single or multiturn versions (up to 4096 revolutions)
- Operating temperature: - 40 °C to + 85 °C
- Optionally with speed signal
- Other PCB types are possible on request

## Design and function

Recording of the angular position by means of a Hall sensor and signal processing including generation of the output signal - in addition to the angular position, a speed signal can also be output in digits / time unit - electrical connection via screw clamp (5-pin, conductor cross-section max. 0.5 mm<sup>2</sup>) or PTFE pigtail connector, 300 mm long - a CAN controller at the output enables connection to the CANopen network. According to CANopen Application Layer and Communication Profile, CiA Draft Standard 301, Version 4.1 and according to Device Profile for Encoders CiA Draft Standard Proposal 406, Version 3.0 and CANopen Layer setting Services and Protocol (LSS), CiA DSP 305.

In the multiturn version, the number of revolutions is recorded in a counter. The position value is saved on shutting off the supply voltage. In voltage-free condition, the position value is recorded on movement of the shaft in a range of  $\leq \pm 90^\circ$ .

## CANopen features

■ NMT master:	No
■ NMT slave:	Yes
■ Maximum boot-up:	No
■ Minimum boot-up:	Yes
■ COB ID distribution:	Default, SDO
■ Node ID distribution:	Via Index 2000 or LSS
■ No. of PDOs:	2 Tx
■ PDO modes:	Sync, async, cyclic, acyclic
■ Variable PDO mapping:	No
■ Emergency message:	Yes
■ Heartbeat:	Yes
■ Node guarding:	No
■ No. of SDOs:	1 Rx / 1 Tx
■ Device profile:	CiA DSP 406 version 3.0

Optionally, node guarding may also be implemented instead of the heartbeat.

The details of the profile are exhaustively described in the [TXN 11551](#) user manual.

# Single and multiturn rotary encoder construction set TKN

**Technical data**

### Output data

- Position: 2 bytes or 4 bytes (in the multiturn version)
- Speed (option): 2 bytes

### Programmable parameters

- Code direction: CW / CCW
- Resolution: 1 to 4096 steps / revolution
- Total number of steps: 1 to 4096 or 134,217,728 steps (in the multiturn version)
- Reference value: 0 to total number of steps - 1
- Gate time: 1-65535 ms (time unit for the speed measurement)

### Electrical data

- Sensor system: ASIC with Hall elements (12-bit resolution)
- EMC standards: EN 61 000-6-4 interference emission  
EN 61 000-6-2 interference immunity
- Operating voltage range: + 17 VDC to + 26 VDC
- Operating current: 70 mA typ. / 100 mA max.
- Resolution: 4096 steps / 360° <- (12-bit)
- Max. measuring range: 4096 revolutions - (12-bit) (in the multiturn version only)
- Linearity: ≤ ± 0.25 % (of 1 revolution)
- Reproducibility: ≤ ± 0.02 %
- Temperature drift: < ± 0.2 % (of 1 revolution for the entire temperature range)
- Maximum radial / axial offset of the position magnet: Magnet RM44: 0.1 mm, magnet RM12-4: see next page
- Output code: Binary
- Code path: CW / CCW
- Reference value: 0 to (total number of steps -1)
- Speed signal: Steps / time unit, 16-bit signed value (time unit (gate time) adjustable, default: 100 ms)
- CAN interface: According to ISO/DIS 11898
- Address setting: Via SDO or LSS
- Terminating resistor: To be implemented separately
- Max. transmission length: 200 m\*

### Mechanical data

- Rotation speed max.: Multiturn and singleturn without speed signal: 10000 min<sup>-1</sup>  
Singleturn with speed signal:  $\frac{0,25}{\text{Gate time [min-1]}}$   
e.g.: 

<u>Gate time</u>	<u>Max. rpm</u>
10 ms	1500 min <sup>-1</sup>
100 ms	150 min <sup>-1</sup>
- Weight: Approx. 0.200 kg

### Environmental data

- Operating temperature range: -40 °C to +85 °C
- Storage temperature range: -20 °C to +60 °C (due to packaging)
- Resistance:
  - To shock: 500 m/s<sup>2</sup>; 11 ms  
DIN EN 60068-2-27
  - To vibration: 10 Hz ... 2000 Hz; 100 m/s<sup>2</sup>  
DIN EN 60068-2-6
- Protection type (DIN EN 60529): IP 00

### Electrical connection (2 versions)

- Screw clamp, 5-pin, max. 0.5 mm<sup>2</sup>
- PTFE pigtail connectors, 300 mm long

\* No galvanic separation between supply voltage and bus lines (also see CiA DS301).

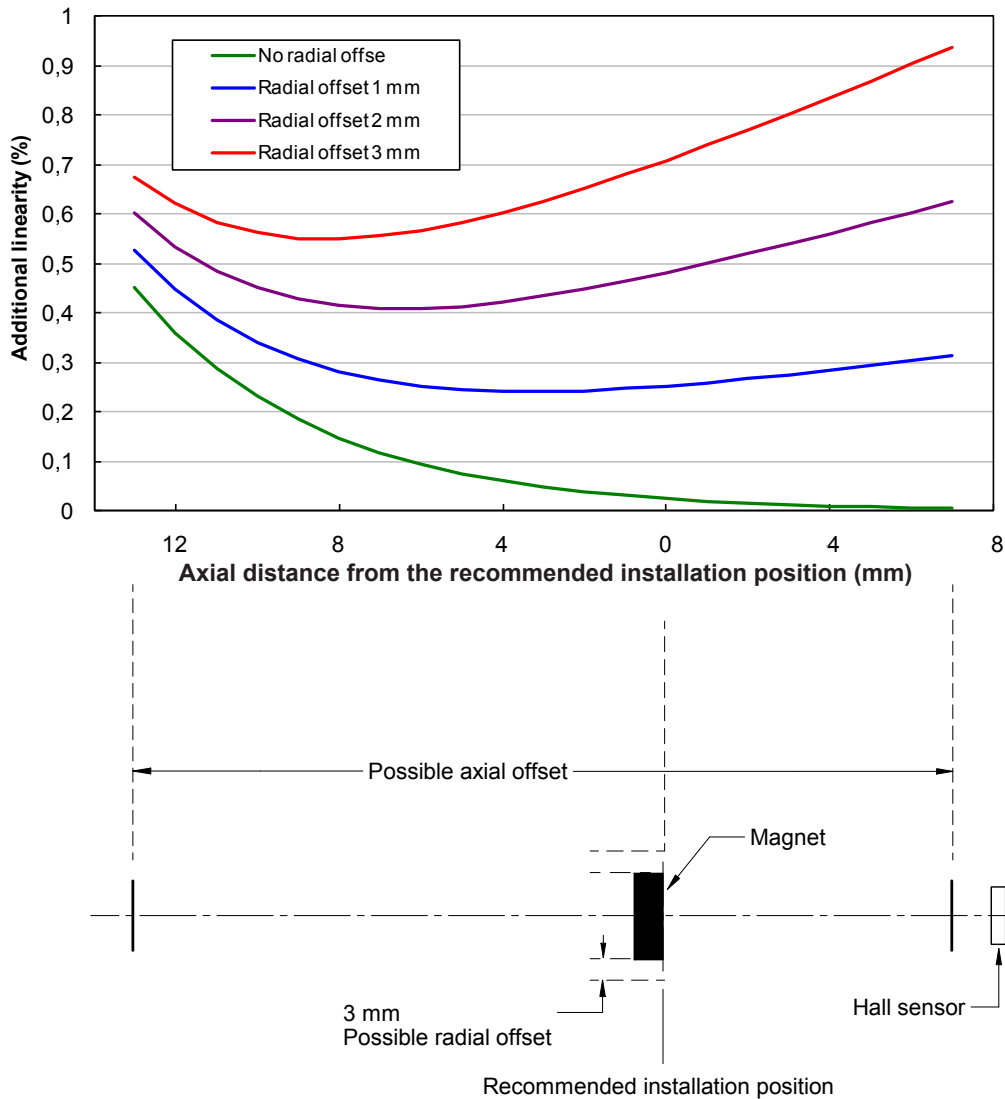
Single and multturn rotary encoder construction set TKN

Technical data

Linearity with position magnet RM12-4

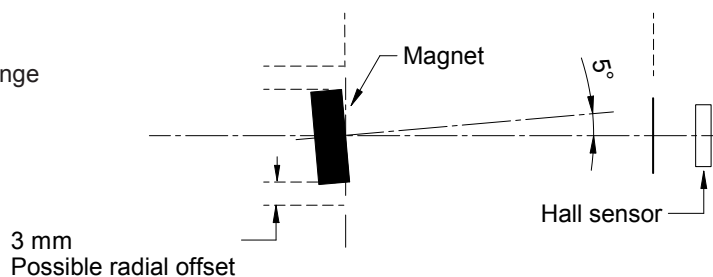
Use of the position magnet RM12-4 enables greater axial and radial magnet offset. However, an additional linearity deviation occurs depending on offset. The deviation is shown in the following diagram for the four radial offset values of 0 mm, 1 mm, 2 mm and 3 mm.

Additional linearity depending on the axial and radial offset



Maximum tilt angle of the magnet

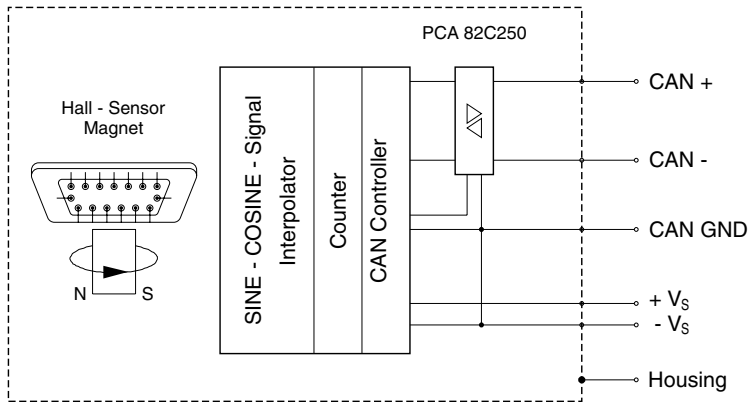
Tilting the magnet by up to  $\pm 5^\circ$  may change the linearity by a maximum of 0.8%.



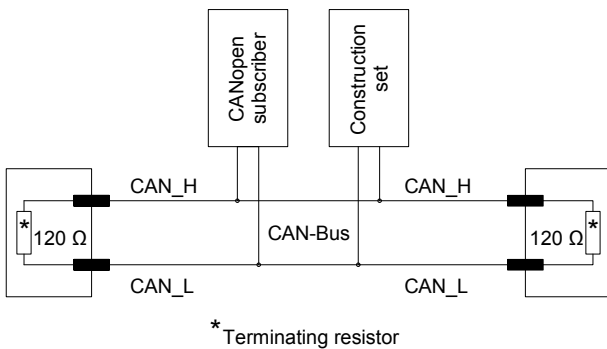
# Single and multiturn rotary encoder construction set TKN

## Electrical connection

### Principle circuit diagram

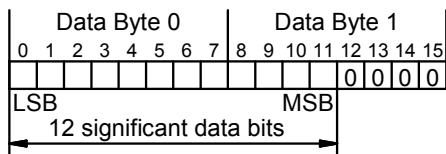


### Bus activation according to ISO / DIS 11898



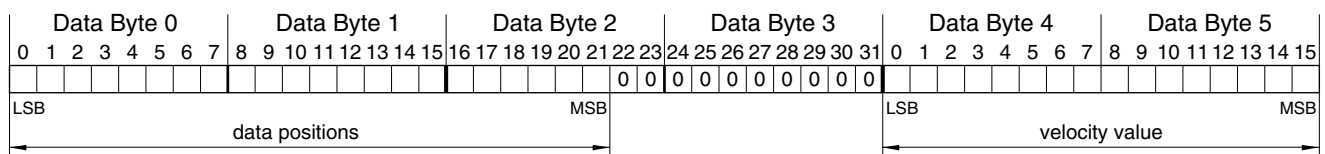
### CANopen data profiles (single-turn version)

PDO 1/ PDO 2



### CANopen data profiles (multiturn version with speed signal)

PDO 1/ PDO 2



**Single and multiturn rotary encoder construction set TKN**

**Order number**

<b>TKN</b>	<b>46</b>	<b>-</b>	<b>4096</b>	<b>R</b>	<b>1024</b>	<b>C2</b>	<b>C</b>	<b>N</b>	<b>01</b>
Electrical and / or mechanical variants*									
01 Standard									
Interface:									
N CANopen									
Electrical connection:									
C Screw clamps									
K Cable outlet									
Profile:									
C2 CANopen according to CiA, DS 406 Revision 3.0									
1 ... Measuring range with multiturn version only									
4096 Revolutions									
Output code:									
R Binary									
Resolution:									
4096 Steps / revolution									
Design form:									
46 Others on request									
TKN	TKN model with CANopen interface								

**Scope of delivery**

- Rotary encoder printed circuit board
- RM44 Position magnet, diameter 4 mm, height 4 mm

**Accessories**

- Further position magnets
  - RM12-4** Position magnet, diameter 12 mm, height 4 mm
  - RMN12-N12** Magnetic hub for mounting on a shaft with a diameter of 12 mm, incl. position magnet RM12-4

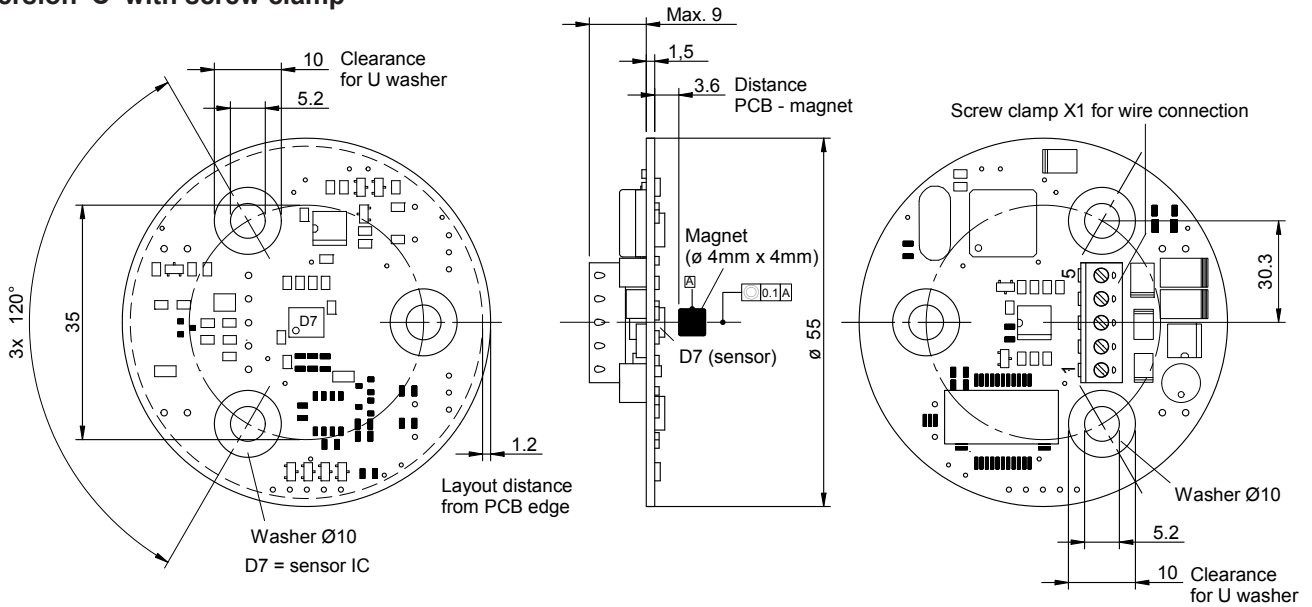
\* The basic versions according to the data sheet bear the number 01. Deviations are identified with a variant number and are documented in the factory.

Single and multiturn rotary encoder construction set TKN

Dimensions in mm

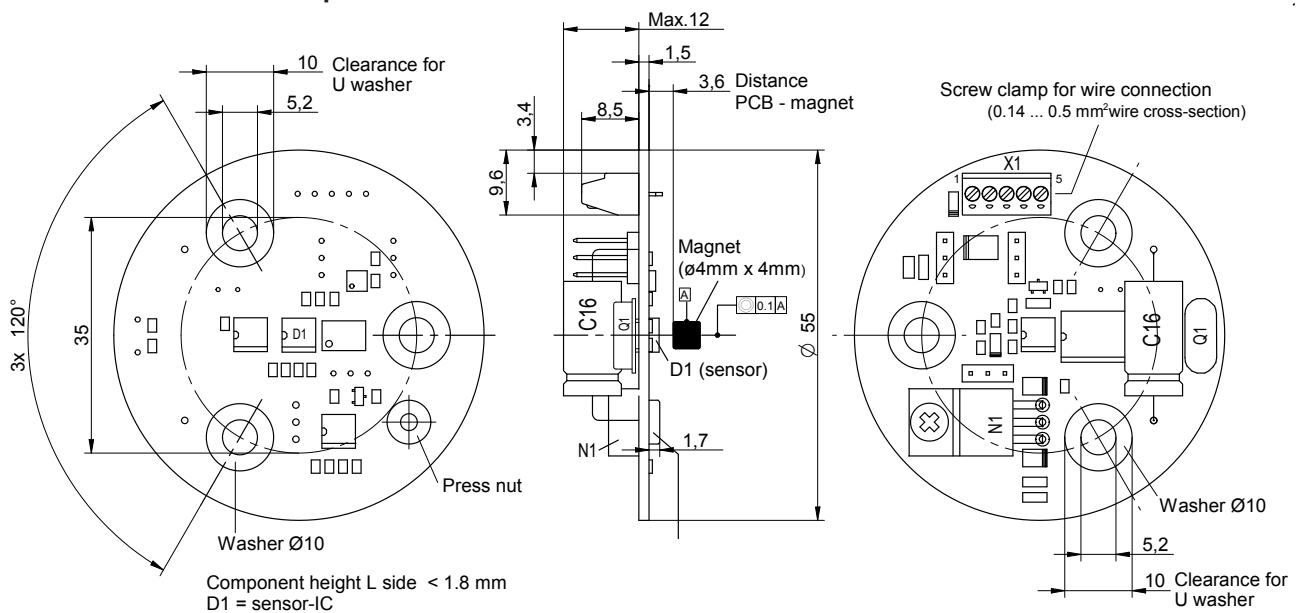
Single-turn version, design form 46

Version 'C' with screw clamp



Multiturn version, design form 46

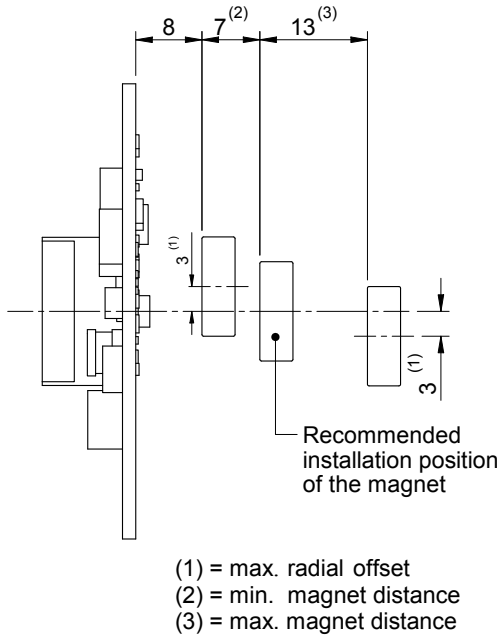
Version 'C' with screw clamp



Single and multturn rotary encoder  
construction set TKN

Dimensions in mm

Single or multturn version with position magnet RM12-4



Accessories

Magnetic hub RMN12-N12

Dimensions in mm

