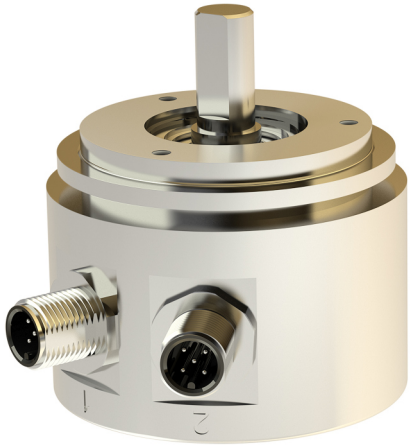
SUPREME SENSORING

Absolute singleturn encoder
Model TBN58/R2
Interface: CANopen, redundant

Document no.:
TBN 15240 DE
07.11.2024



- **Contactless, wear-free magnetic sensor system**
- **Housing diameter 58 mm**
- **Resolution 2 x 16384 steps / 360° (2 x 14 Bit) in binary code**
- **Interface 2 x CANopen in accordance with CiA DS406, completely autarkic design as Bus 1 and Bus 2**
- **Sturdy mechanical design, high vibration and shock-resistance**
- **Working temperature range - 40 °C to + 85 °C**
- **Protection grade IP67/69K (electronic)**
- **Sensor input unit for Cat3 acc. DIN EN ISO 13849 systems suitable**

CANopen

R2 REDUNDANT FUNCTIONAL SAFETY SENSOR

KEY INFORMATION OVERVIEW

DESIGN & FUNCTION

With the TBN model, one rotation is recorded. A positive-locking mechanical connection between the customer's shaft and the sensor shaft ensures that the magnet in the sensor shaft precisely reflects the rotation of the customer's shaft.

Recording of the angle position with two magnetic sensors and signal processing, including generation of the digital output signals, completely autarkic designed.

Sturdy aluminium housing - stainless steel shaft, shaft diameter 10f7 with flat area (9 - 0.1 mm), RS bearing with Nilos ring - housing potting and 2-chamber construction for IP 67/69K - electrical connection via 2 sensor connectors (M12 connector, 5-pin) for Bus 1 and Bus 2. One hex rotary coding switch for adjusting the address under the blind plug.

The encoders are suitable for performance level d (PLd), category 3 applications according to DIN EN ISO 13849.

FEATURES INTERFACE

The position and speed values are output via the CANopen protocol (PDO - Process Data Object).

- **CiA DS301**
  CANopen Application Layer and Communication Profile, Version 4.1
- **CiA DS305**
  CANopen - Layer Setting Services and Protocol (LSS)
- **CiA DS406**
  CANopen - Device Profile for Encoders, Version 4.0.2

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TECHNICAL DATA

ELECTRICAL DATA

Sensor system	Redundant magnetic sensor system
Operating voltage	+ 9 VDC to + 36 VDC
Short-circuit protection	yes
Reverse-polarity protection	yes (power supply)
Power consumption	< 1 W
Resolution	16384 steps / 360° - 14 Bit
Accuracy	≤ ± 0.05 %
Reproducibility	≤ ± 0.02 %
Synchronisation of the systems	≤ ± 1°
Temperature drift	≤ 0.02 °/K
Output code	Binary
Code sense	CW (clockwise)

CANOPEN OVERVIEW OF SPECIFICATIONS

CiA DS301	CANopen Application Layer and Communication Profile, Version 4.1
CiA DS305	CANopen - Layer Setting Services and Protocol (LSS)
CiA DS406	CANopen - Device Profile for Encoders, Version 4.0.2
CAN-Interface	according to ISO/DIS 11898
Address setting	hex rotary coding switch for Bus 1 and Bus 2 and via SDO / LSS
Terminating resistance	to be implemented separately
Max. transmission length	200 m - no galvanic isolation between supply voltage and Bus (see also CiA DS301)
NMT Master	no
NMT-Slave	yes
Maximum Boot up	no
Minimum Boot up	yes
COB ID Distribution	default, SDO
Node ID Distribution	via switches or Index 2000 and LSS
No of PDOs	2 Tx / Node
PDO-Modes	sync, async, cyclic, acyclic
Variable PDO-Mapping	no
Emergency Message	yes
Heartbeat	yes
No. of SDOs	1 Rx / 1 Tx

The profile details are described in detail in the user manual TXN 15469.

MECHANICAL DATA

Operating speed	1.000 min^{-1} max.
Angular acceleration	10^5 rad/s^2 max.
Moment of inertia (rotor)	20 gcm^2
Operating torque	≤ 8 Ncm (at 500 rpm)
Starting torque	≤ 4 Ncm
Permissible shaft load	50 N axial / radial
Bearing service life	≥ 10^9 rotations (at max. perm. shaft load)
Mass	approx. 0.37 kg

ENVIRONMENTAL DATA

Working temperature range	- 40 °C to + 85 °C	
Storage temperature range	- 20 °C to + 60 °C (due to packaging)	
Resistance	To shock	1000 m/s²; 11 ms (DIN EN 60068-2-27)
	To vibration	500 m/s² ; 10 to 2000 Hz (DIN EN 60068-2-6)
EMV standards	EN 61000-4-2 (ESD)	
	EN 61000-4-4 (Burst)	
	EN 61000-6-4 (Emission)	
E1 type examination	certified	
Magnetic field	with 1 mT fault < 0.1 %	
Protection grade (DIN EN 60529)	electronic	IP 67/69K (electronic)
	mechanical	IP65 mechanical (IP67/IP69K optional)

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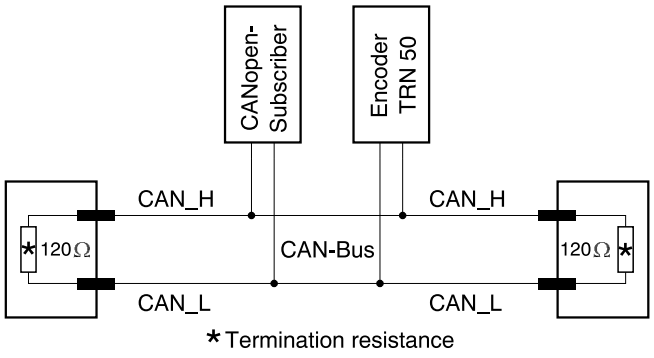
TECHNICAL DATA

SAFETY DATA

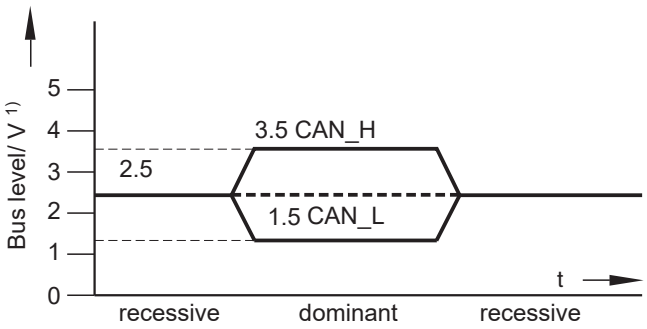
The calculations were carried out using the „Parts Count Method“ based on the British Telekom Handbook of Reliability Data (BT-HRD5). Furthermore, MTTFd = MTTF*2.
The following values apply for each channel separately and for all variants mentioned in the order identification.
MTTFd at 25° . . . . . 842,20 years
MTTFd at 55° . . . . . 503,12 years
MTTFd at 70° . . . . . 347,4 years
MTTFd at 85° . . . . . 227,72 years

TECHNICAL DATA / PRODUCT CHARACTERISTICS

BUS CONNECTION AS PER ISO/DIS 11898



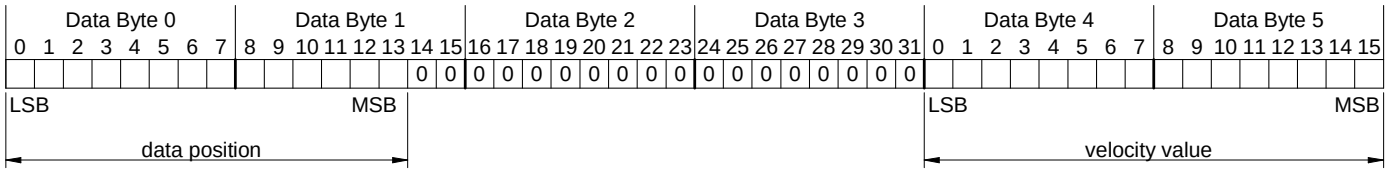
OUTPUT LEVEL AS PER ISO/DIS 11898



1) at Common-Mode-Voltage = 0 V

DATA PROFILE CANOPEN PDO1/2 FOR BUS 1 AND BUS 2

PDO 1 / PDO 2



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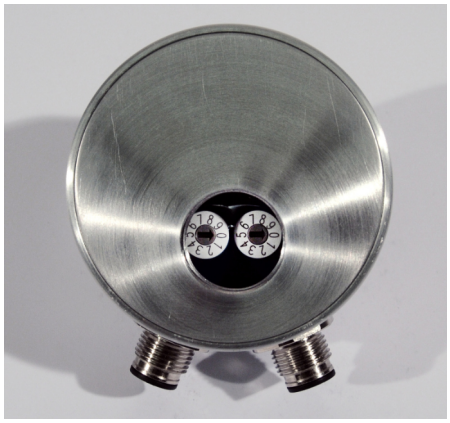
TECHNICAL DATA / PRODUCT CHARACTERISTICS

ALLOCATION OF THE ROTARY CODING SWITCHES

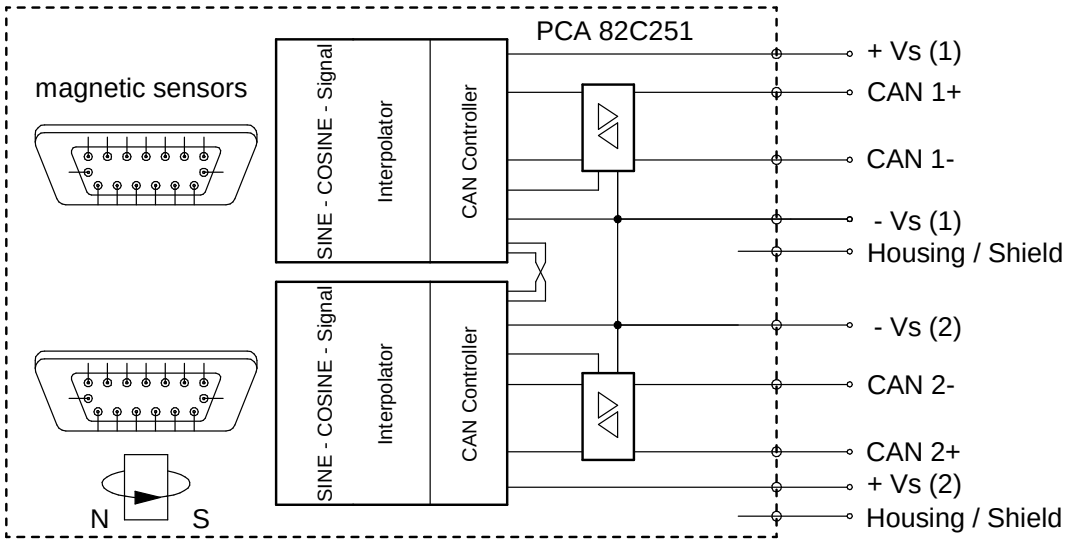
The default node ID value is 0x1 for Bus 1 and 0x2 for Bus 2 (see object 2000h in manual 15469). Different addresses can be configured using the rotary coding switches (see table below).



DEFINITION OF THE NODE ID DUE TO SETTING OF THE ROTARY CODING SWITCHES

Rotary coding switches	Node-IDs Bus1	Node-IDs Bus2
0	0x1	0x2
1	0x3	0x4
2	0x5	0x6
3	0x7	0x8
4	0x9	0xA
5	0xB	0xC
6	0xD	0xE
7	0xF	0x10
8	0x11	0x12
9	0x13	0x14

SCHEMATIC DIAGRAM



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ORDER CODE FORMAT

TBN	58 -	S	A	16384	R	R2	C3	S2	N	01	STANDARD VERSION

TBN	Singleturn rotary encoder with CANopen-Interface		
58	Design form	58	Design form Ø 58 mm
S	Flange and shaft	S	Synchro flange, shaft Ø 10 mm with flat
A	Housing material	A	Aluminium 3.2315
16384	Resolution in steps / 360°	16384	14 Bit
R	Code	R	Binary
R2	Redundant design	R2	2 x autarkic sensors
C3	Profile	C3	Standard CANopen, Profile version 4.0.2
S2	Electrical connection	S2	2 x device connector M12-A, 5-pole, male
N	Output	N	CANopen-Interface
01	Electrical and mechanical variants*	01	Standard

* According to the data sheet, the basic version are indicated by the number 01. Deviations are indicated by a version number and are documented at TWK.

ACCESSORIES

MATING CONNECTORS

Order number	Type	Design & wire fixing	Housing-material	Cable ø & wire size	Shielding & IP grade
STK5GS56	M12-A 5-pole, female	Straight, screws	Brass, nickel-plated	6 – 8 mm ≤ 0.75 mm²	On housing IP67
STK5WS58	M12-A 5-pole, female	Angled, screws	Brass, nickel-plated	6 – 8 mm ≤ 0.75 mm²	On housing IP67

DOCUMENTATION

DOCUMENTATION

The following documents can be found in the Internet under www.twk.de/en in the documentation area, model TBN58/R2.

Data sheet TBN15240
Installation instructions AN16169
Declaration of conformitiy ZE16569
Reach compliant QS15286
RoHS compliant QS13284

INSTALLATION DRAWINGS

MODEL TBN58-S A 16384 R R2 C3 S2 N 01

Dimensions in mm