

Absolute singleturn encoder TRK38/S3 with EtherCAT® FSoE Interface



Safety over
EtherCAT®



- Ultra compact version with a diameter of only 38mm
- Contactless, wear-free sensor system according to the Hall principle
- High vibration and shock resistance
- SIL2 and Performance Level d
- Safe position and safe speed signal
- Resolution: up to 65536 steps/360° ↯ (16 Bit)
- Programmable via EtherCAT
- For the safe monitoring of the speed of e.g. AGV

Design and function

Robust aluminium housing - stainless steel shaft - magnetic sensor system - electrical connection via cable output.

In the model series TRK absolute encoders, the EtherCAT interface is integrated according to IEC 61158-2 to 6 and encoder profile CiA DSP406.

To achieve the SIL2 level, the TRK/S3 contains a redundant sensor system and additional internal monitoring mechanisms as well as safe communication via the FSoE (failsafe over EtherCAT) protocol. The FSoE protocol is implemented according to the Safety over EtherCAT specification ETG.5100 version 1.2.0.

The detailed description of the integration and commissioning in an EtherCAT network is described in detail in the user manual [TRK/S3 13349](#).

EtherCAT® Features

- Failsafe over EtherCAT protocol (FSoE)
- Complex slave with CANopen over EtherCAT (CoE)
- "Full slave" - all addressing modes except segment addressing
- All EtherCAT write/read-Services
- Fieldbus Memory Management Unit (FMMU)
- Sync-Manager
- Firmware Update via EtherCAT (FoE)

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Absolute singleturn encoder TRK38/S3

Technical data

Input/output data *

- Input 8 byte (4 byte position data, 2 byte speed data, 2 byte status word)
- Output 2 byte control word

Electrical data

- Sensor system: magnetical
- Operating voltage: + 9 VDC to + 30 VDC (reverse voltage protection)
- Power consumption: < 2 W, switch-on current < 500 mA
- Resolution: up to 65,536 steps/360°< - (16-bit)
- Measuring range: 1 revolution
- Total number of steps: up to 16 bit
- Absolute accuracy of the position value: $\pm 0.1\%$ (with reference to one revolution)
- Absolute accuracy of the speed value: $\pm 0.4\%$ (with reference to the maximum speed value of 32767 steps/gate time)
- Toleranz of the internal position monitoring 1.5 % (with reference to one revolution)
- Internal updating time of the position value: 2 ms
- Output code: binary
- Code sense: CW/CCW
- Speed signal: 16-bit, with prefix, unit: steps/gate time
(gate time adjustable in the 10 ... 1000 ms range, default: 100 ms)
- Internal updating time of the speed signal: 2 ms
- Programmierbare Parameter: preset, code sense, gate time and scaling of the speed value

EtherCAT data

- Transfer technology: 100 Base-TX
- Transfer rate: 100 MBit/s
- Cable length: Max. 100 m (between two subscribers)

Mechanical data

- Operating speed: 5000 rpm max.
- Angular acceleration: 10^5 rad/s^2 max.
- Moment of inertia (rotor): < 0,05 gcm²
- Operating torque: $\leq 2,5 \text{ Ncm}$ (at 500 rpm)
- Starting torque: $\leq 1,5 \text{ Ncm}$
- Perm. shaft load: 20 N axial, 45 N radial
- Bearing service life **: $\geq 10^9$ revolutions
- Weight: approx. 0,082 kg

Environmental data

- Operating temperature range: - 40°C to + 70°C
- Storage temperature range: - 40°C to + 100 °C (without packaging)
- Resistance
 - To shock: 500 m/s²; 6 ms, DIN EN 60068-2-27
 - To vibration: 250 m/s²; 10 ... 2000 Hz, DIN EN 60068-2-6
- Protection class: IP40
- Altitude: $\leq 2000 \text{ m}$
- Power frequency magnetic field immunity test (EN 6100-4-8): 30 A/m, test criterion A (± 8 digit at 13 Bits output resolution)
100 A/m, test criterion B

* From the point of view of the control system.

** These values apply at maximum shaft load. Higher values are achievable at lower loads.

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Technical data

EMC standards

EN 61000-6-4:2006 + A1:2011	EMC Part 6-4: Generic standards-Emission standard for industrial environments
EN 61000-6-2:2005	EMC Part 6-2: Generic standards-Immunity for industrial environments
EN 61000-4-2:2009	EMC Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test
EN 61000-4-3:2006 A1:2008 + A2:2010	EMC Part 4-3: Testing and measurement techniques - Radiated, radio frequency, electromagnetic field immunity test
EN 61000-4-4:2004	EMC Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test
EN 61000-4-5:2006	EMC Part 4-5: Testing and measurement techniques - Surge immunity test
EN 61000-4-6:2009	EMC Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields
EN 61000-4-8:2010	EMC Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test Power frequency magnetic field immunity test: 30 A/m, test criterion A (± 16 digit) 100 A/m, test criterion B
EN 61000-4-29:2000	EMC Part 4-8: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations on d.c. input power port immunity tests
IEC 61326-3-2:2018	Electrical equipment for measurement, control and laboratory use - EMC requirements Part 3-2: Immunity for safety-related systems and for equipment intended to perform safety related functions (functional safety) - industrial applications with specified electromagnetic environment

Safety data

All values apply to +70°C

- According to DIN EN 61508:
 - PFH = 9,95101E-08
 - SFF = 92,04%
 - HFT = 0
 - SIL2
- According to DIN EN ISO 13849-1:
 - MTTF_d = 100 years (calculated 557,3853 years)
 - DC = 95,36%
 - Categorie 2
 - Performance Level d
- Maximum service life:
 - 20 years (please contact us for longer service lifes)

Electrical connection

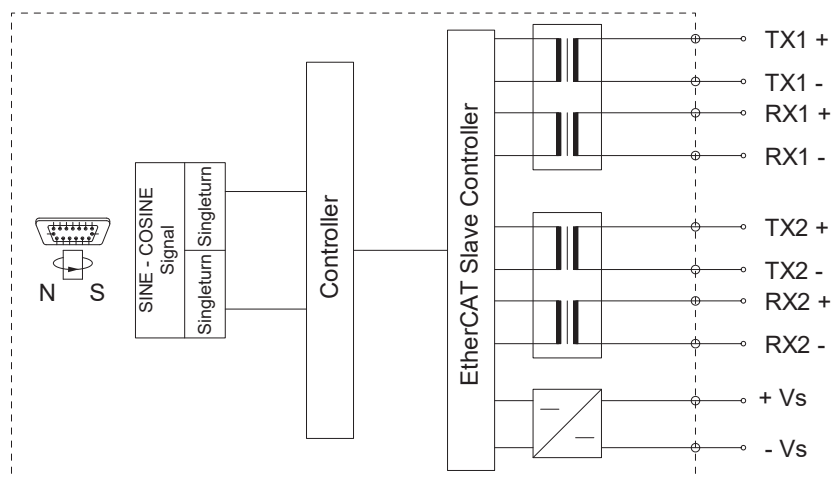
- EtherCAT and supply:
 - M12 connector, 12 pins, A coded

Pin	Signal
1	-U _B (0 VDC)
2	+U _B (+24 VDC)
3	TX2+
4	TX2-
5	RX2+
6	RX2-
7	TX1+
8	TX1-
9	RX1+
10	RX1-
11	n.c.
12	n.c.

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Block diagram, order number, documentation

Block diagram



Order number

TRK	38	-	S	A	65536	R	S3	T1	K	01	→ Standard version
											Electrical and/or mechanical variants*
											01 Standard
											Output:
											K 100Base-TX
											Electrical connection:
											T1 1x M12 connector, 12 pin, A coded, axial
											Profile:
											S1 FSoE, not certified sample devices
											S3 FSoE, SIL 2 certified
											Output code:
											R Binary
											Resolution:
											65536 Steps/360° ↺
											Housing material:
											A Aluminium
											Flange:
											38 S Synchro flange, shaft 6 mm with hole for threaded pin
											Design form
											Series:
											TRK T series with EtherCAT interface

Documentation, EDS file, etc.

The following documents plus the ESI file can be found in the Internet under www.twk.de in the documentation area, model TRK/S3.

- Data sheet no. TRK38/S3 15899
- Manual no. [TRK/S3 13349](#)

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

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Installation drawings

Design form 38 with synchro flange, order code: TRK38-SA65536RS3T1K01

Shaft \varnothing 6 mm, with hole for threaded pin

Dimensions in mm

