SUPREME SENSORING

# Absolute multiturn encoder
# Model TRK
# Interface: EtherCAT®

Document no.:
TRK 12825 KE
29.11.2024

- **Contactless, wear-free sensor system**
- **High vibration and shock resistance thanks to the robust mechanical design**
- **Resolution: 4096 steps / 360° - 12 bit (13 bit optional)**
- **Measuring range: 4096 revolutions**
- **Dual-chamber system for separating shaft and electronics**
- **Protection type: up to IP69K**
- **Slew ring function on request**

## KEY INFORMATION OVERVIEW

### DESIGN & FUNCTION

Recording of the angular position and revolutions by means of Hall sensors - absolute multiturn transmission for up to 4096 revolutions - data output plus parameterisation and diagnosis via EtherCAT.

Robust housing (housing sickness 5 mm) manufactured from seawater-resistant aluminium (AlMgSi1) or stainless steel - stainless steel shaft - ball bearing with shaft seal - sensors circuit consisting of ASIC with Hall elements - electrical connection via M12 connector or cable outlet.

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

As a "full slave", the TRK supports all EtherCAT addressing modes such as logical addressing, position addressing and node addressing.

### FEATURES INTERFACE

Use of the CANopen over EtherCAT message and the CANopen encoder profile enable parameter and diagnostic data handling as familiar from CANopen. These are contained in an object directory under the same indices as in the case of CANopen. The process data are transmitted in PDOs whose composition is defined via PDO mapping.

The project planning and commissioning of a TWK absolute encoder with EtherCAT interface are described in detail in the CRK11780 user manual.

- Complex slave with CANopen over EtherCAT (CoE)
- “Full slave“ - all addressing modes except segment addressing
- All EtherCAT write/read services
- Field-bus Memory Management Unit (FMMU)
- Sync-manager
- Distributed Clocks (on request)

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## TECHNICAL DATA

### ELECTRICAL DATA

| | |
|---|---|
| Sensor system | Magnetic |
| Operating voltage | + 9 VDC to + 36 VDC |
| Power consumption | < 3 W |
| Switch-on current | < 500 mA |
| Resolution | 4096 steps / 360° - 12 bit (13 bit optional) |
| Measuring range | 4096 revolution |
| Total number of steps | 24 bit (optional 25 bit) |
| Accuracy | ± 0.2 % (with reference to one revolution) |
| Output code | Binary |
| Code path | CW / CCW |
| Internal updating time | ≤ 2 ms |

### INPUT DATA*

4 byte position data
2 byte speed data (on request)

### OUTPUT DATA*

2 byte control word

### ETHERCAT DATA

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

### DIAGNOSIS LEDS

| | |
|---|---|
| LED 1 (UB, green) | Operating voltage availabe |
| LED 2 (L/A1, green) | Link/Activity1: Network connection established |
| LED 3 (L/A2, green) | Link/Activity2: Network connection established |
| LED 4 (NS, green/red) | Device Status & error modes |

### MECHANICAL DATA

| | | |
|---|---|---|
| Operating speed | 4.000 rpm max. | |
| Angular acceleration | $10^5$ rad/s² max. | |
| Moment of inertia (rotor) | 20 gcm² | |
| Operating torque | ≤ 8 Ncm (at 500 rpm) | |
| Starting torque | ≤ 4 Ncm | |
| Perm. shaft load | 250 N axial<br>250 N radial | |
| Bearing service life ** | > $10^9$ revolutions approx. | |
| Weight | ca. 0.450 kg (stainless steel version: ca. 0.7 kg) | |

### ENVIRONMENTAL DATA

| | | |
|---|---|---|
| Operating temperature range | - 40 °C to + 85 °C | |
| Storage temperature range | - 40 °C to + 100 °C (without packing) | |
| Resistance | To shock | 500 m/s²; 11 ms<br>DIN EN 60068-2-27 |
| | To vibration | 500 m/s²; 10 ... 2000 Hz<br>DIN EN 60068-2-6 |
| EMC | DIN EN 61000-6-2 (interference immunity)<br>DIN EN 61000-6-4 (interference emission) | |
| Protection type | IP 66 / IP 67, with cable outlet IP68, IP69K (optional), DIN EN 60529 | |

* 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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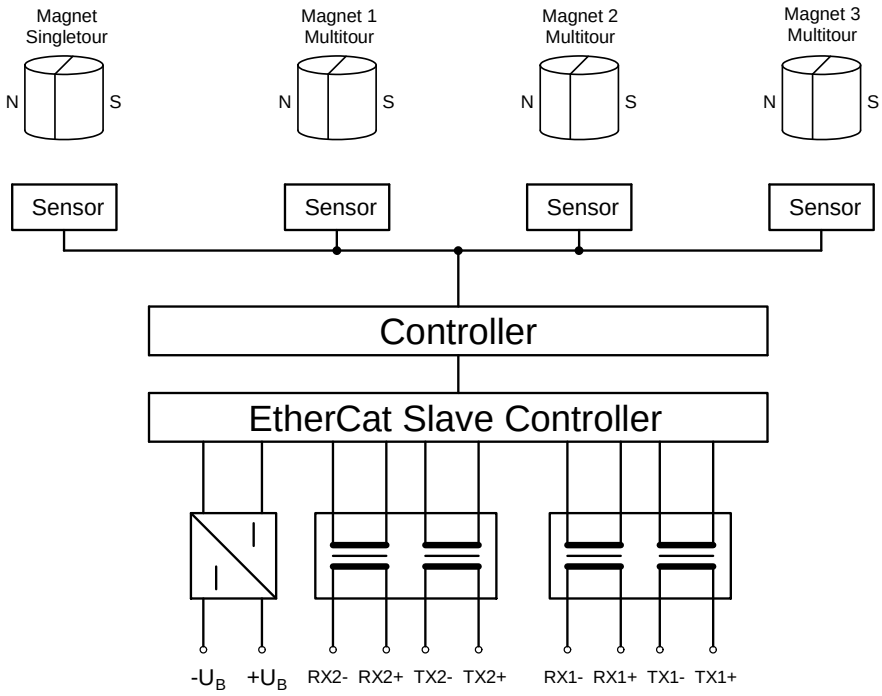
## TECHNICAL DATA

### PROGRAMMABLE PARAMETERS (REFER TO HANDBOOK CRK11780 FOR DETAILS)

Code path . . . . . CW / CCW (clockwise / counter clockwise)
Resolution [steps / 360°] . . . . . 1 to 4096 (1 to 8192 at 13 bit)
Total number of steps [steps] . . . . . 1 to 16777,216 (1 to 33,554,432 at 13 bit)
Reference value . . . . . 0 to total number of steps -1 (reference value can be set via bit 0 in the control word)

### PRINCIPAL CIRCUIT DIAGRAM



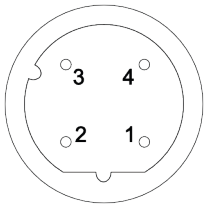
## ELECTRICAL CONNECTION

### ELECTRICAL CONNECTION

EtherCAT . . . . . M12 connector D-coded 4-pin for bus in / bus out, socket or cable output via cable glands
Supply . . . . . M12 connector A-coded 4-pin, pins or cable output via cable glands

### ETHERCAT CONNECTOR, 2X M12, D-CODED, SOCKET/FEMALE

| PIN. | Function |
|---|---|
| 1 | TX+ |
| 2 | RX+ |
| 3 | TX- |
| 4 | RX- |

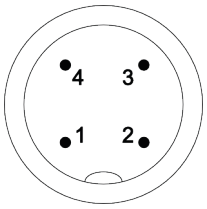



### ETHERCAT CABLE OUTPUT (2X)

| Colour* | Function |
|---|---|
| Yellow | TX+ |
| White | RX+ |
| Orange | TX- |
| Blue | RX- |

### SUPPLY CONNECTOR, M12, A-CODED, PINS/MALE

| PIN. | Function |
|---|---|
| 1 | +UB (+24 VDC) |
| 2 | not used |
| 3 | -UB (0 VDC) |
| 4 | not used |




### SUPPLY CABLE OUTPUT

| Colour* | Function |
|---|---|
| White | +UB (+24 VDC) |
| Brown | -UB (0 VDC) |

### REMARK

Only use shielded cable for power supply and PROFINET

### CABLE OUTPUT ETHERCAT (OPTIONAL)

Cable type . . . . . PROFINET Type-C, 4 x 0,36 mm2 (AWG22)
Cable jacket. . . . . PUR, color: green
Temperatur range . . . . . - 40 °C to + 70 °C
Outer diameter . . . . . 6,5 mm ± 0,2 mm
Min. bend radius . . . . . 5 x d fixed installation, 10 x d freely movable

### CABLE OUTPUT POWER SUPPLY (OPTIONAL)

Cable type . . . . . 2 x 0,75 mm², shielded
Cable jacket. . . . . PUR, color: gray
Temperatur range . . . . . - 40 °C to + 80 °C fixed installation, - 5 °C to + 70 °C freely movable
Outer diameter . . . . . 6 mm
Min. bend radius . . . . . 6 x d fixed installation, 15 x d freely movable

* Industrial Ethernet cable colours according to ISO / IEC 8802-3

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## ORDER CODE FORMAT

| TRK | 58 - KP | A | 4096 | R | 4096 | C1 | M | K | 01 | STANDARD VERSION |
|---|---|---|---|---|---|---|---|---|---|---|

| | | | |
|---|---|---|---|
| **TRK** | Multiturn rotary encoder with EtherCAT interface | | |
| **58 - KP** | Design form, flange and shaft | 58 - K<br>58 - KF<br>58 - KP<br>58 - KZ<br>58 - S<br>58 - SR<br>58 - ST<br>64 - NZ<br>65 - S<br>65 - SP<br>66 - K<br>105 - M<br>105 - MP | Clamped flange, shaft 10 mm with flat<br>Clamped flange, shaft 10 mm with woodruff key<br>Clamped flange, shaft 10 mm with parallel key<br>Clamped flange, shaft for play-compensating toothed gear ZRS<br>Synchronizer flange, shaft 6 mm<br>Synchronizer flange, clamping shaft 12 mm<br>Synchronizer flange, shaft 6 mm with flat<br>Cam switch flange, shaft for toothed gear ZRS<br>Synchronizer flange, shaft 12 mm<br>Synchronizer flange, shaft 12 mm with parallel key<br>Clamped flange, shaft 10 mm with flat<br>Mounting flange, shaft 12 mm<br>Mounting flange, shaft 12 mm with parallel key |
| **A** | Housing material | A<br>S<br>V | Aluminium 3.2315<br>Stainless steel 1.4305<br>Stainless steel 1.4404 |
| **4096** | Resolution in steps / 360° | 4096<br>8192 | 12 bit<br>13 bit |
| **R** | Code | R | Binary |
| **4096** | Measuring range in revolutions | 4096 | |
| **C1** | Profile | C1 | Standard EtherCAT |
| **M** | Electrical connection | M<br>Kx | 3 x M12 connector<br>Cable, x = length in m |
| **K** | Output | K | EtherCAT |
| **01** | Electrical and/or mechanical variants* | 01<br>02 | Standard<br>Protection type IP69K |

* 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.

## ACCESSORIES (TO BE ORDERED SEPARATELY)

### MATING CONNECTORS

| Order number, Datasheet | Type | Design & wire fixing | Housing-material | Cable ø & wire size | Shielding & IP grade |
|---|---|---|---|---|---|
| **STK4GP81** STK14570 | M12-D 4-pole, male | Straight screws | Zinc die-cast nickel-plated | 5 – 8 mm ≤ 0.75 mm² | On housing IP67 |
| **STK4GP110** STK14569 | M12-D 4-pole, male | Straight screws | Stainless steel 1.4404 | 5.5 – 8.6 mm ≤ 0.75 mm² | On housing IP67 |
| **STK4GS60** STK14572 | M12-A 4-pole, female | Straight screws | Zinc die-cast nickel-plated | 4 – 6 mm ≤ 0.75 mm² | On housing IP67 |
| **STK4GS104** STK14571 | M12-A 4-pole, female | Straight screws | Stainless steel 1.4404 | 5.5 – 8.6 mm ≤ 0.75 mm² | On housing IP67 |
| **STK4WP82** STK14676 | M12-D 4-pole, male | Angled screws | Zinc die-cast nickel-plated | 5 – 8 mm ≤ 0.75 mm² | On housing IP67 |
| **STK4WP116** STK15518 | M12-D 4-pole, male | Angled Insul. displ.con. | Zinc die-cast nickel-plated | 4 – 8 mm ø 1 – 1.6 mm | On housing IP67 |
| **STK4WS61** STK14675 | M12-A 4-pole, female | Angled screws | Polyamid | 4 – 6 mm ≤ 0.75 mm² | - (due to PA) IP67 |
| **STK4WS117** STK16392 | M12-A 4-pole, male | Angled Push lock con. | Zinc die-cast nickel-plated | 4 – 8 mm ø 0.14 – 0.75 mm² | On housing IP67 |

### CONNECTING CABLE - ETHERCAT

**KABEL-xxx-114** . . . . . Industrial Ethernet data cable with M12 connectors, D-coded, moulded on at both ends. Standard lengths: 1, 2, 3 and 5 m, see data sheet KBL14673 (xxx = length in meters)

**KABEL-xxx-118** . . . . . Industrial Ethernet data cable with M12 connector on RJ 45, IP 20 (xxx = length in meters), see data sheet KBL14655

### CONNECTING CABLE - POWER SUPPLY

**KABEL-5-191** . . . . . With moulded M12 connector, A-coded, straight, 2. side open, length 5m, see datasheet KBL13411

### COUPLINGS

**BKK** . . . . . Bellows coupling, large, see data sheet BKK11840
**BKM** . . . . . Bellows coupling, small, see data sheet BKM11995
**KK14S** . . . . . Jaw coupling, see data sheet KK12301

### TOOTHED GEAR

**ZRS** . . . . . Play-compensating toothed gear ZRS11877

### TORQUE SUPPORT

**ZMS** . . . . . See data sheet ZMS12939

Further installation accessories and securing clamps are available according to data sheet MZ10111 .

## DOCUMENTATION

### DOCUMENTATION

The following documents plus the EDS file, a bitmap and example programmes can be found in the Internet under www.twk.de/en in the documentation area, model TRK.

| | |
|---|---|
| Data sheet | TRK12825 |
| Manual | CRK11780 |
| EDS file | EDS file TRK |
| Installation instructions | AN16169 |
| Declaration of conformity | ZE16569 |
| Reach compliant | QS15286 |
| RoHS compliant | QS13284 |

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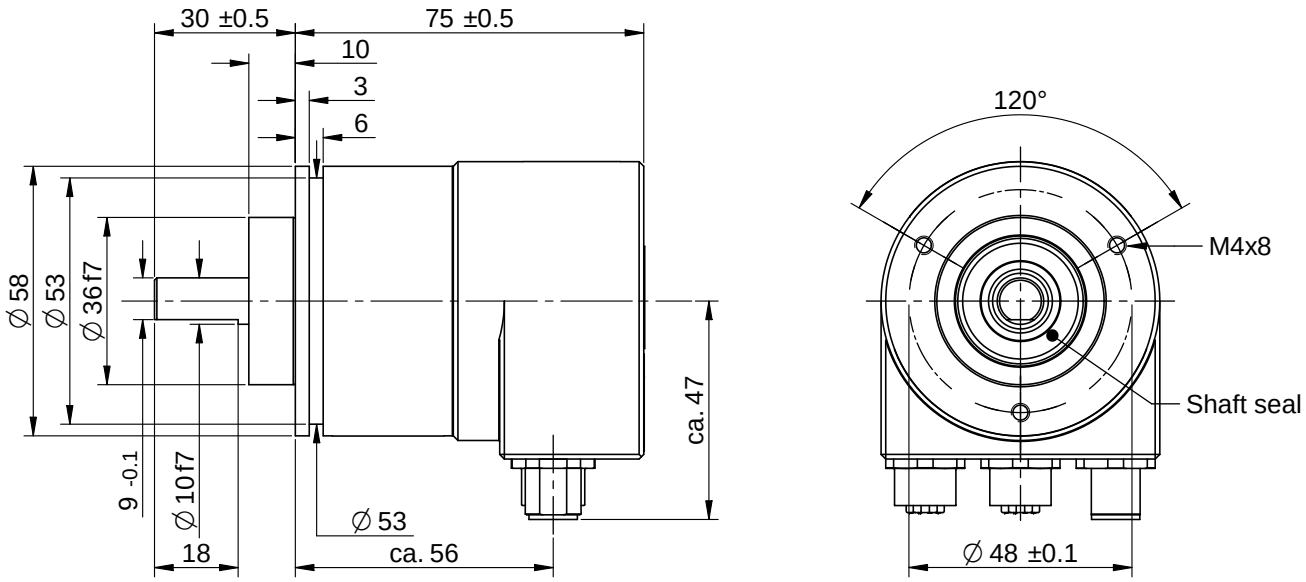
## INSTALLATION DRAWINGS

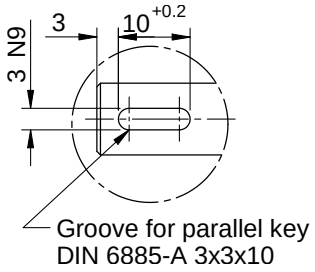
### STANDARD DESIGN FORM
### DESIGN FORM 58 WITH CLAMPED FLANGE, ORDER NUMBER: TRK58-KA 4096 R 4096 C1 M K01

Dimensions in mm

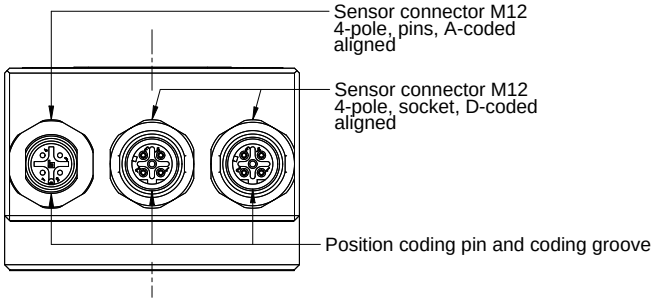



* Singleturn version 14 mm shorter

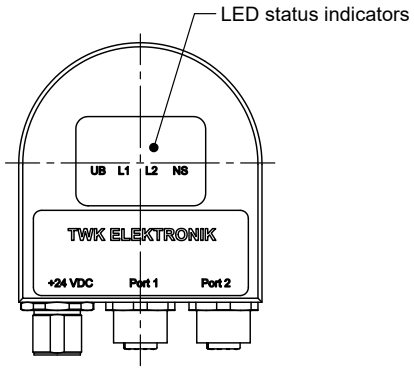
### OPTIONAL:
### SHAFT "P" WITH GROOVE AND FITTED SPRING



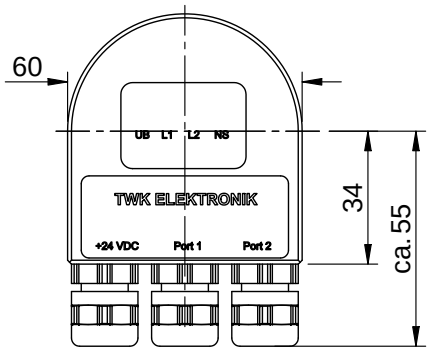

### CONNECTOR VIEW WITH M12-CONNECTOR




### REAR VIEW WITH M12-CONNECTOR



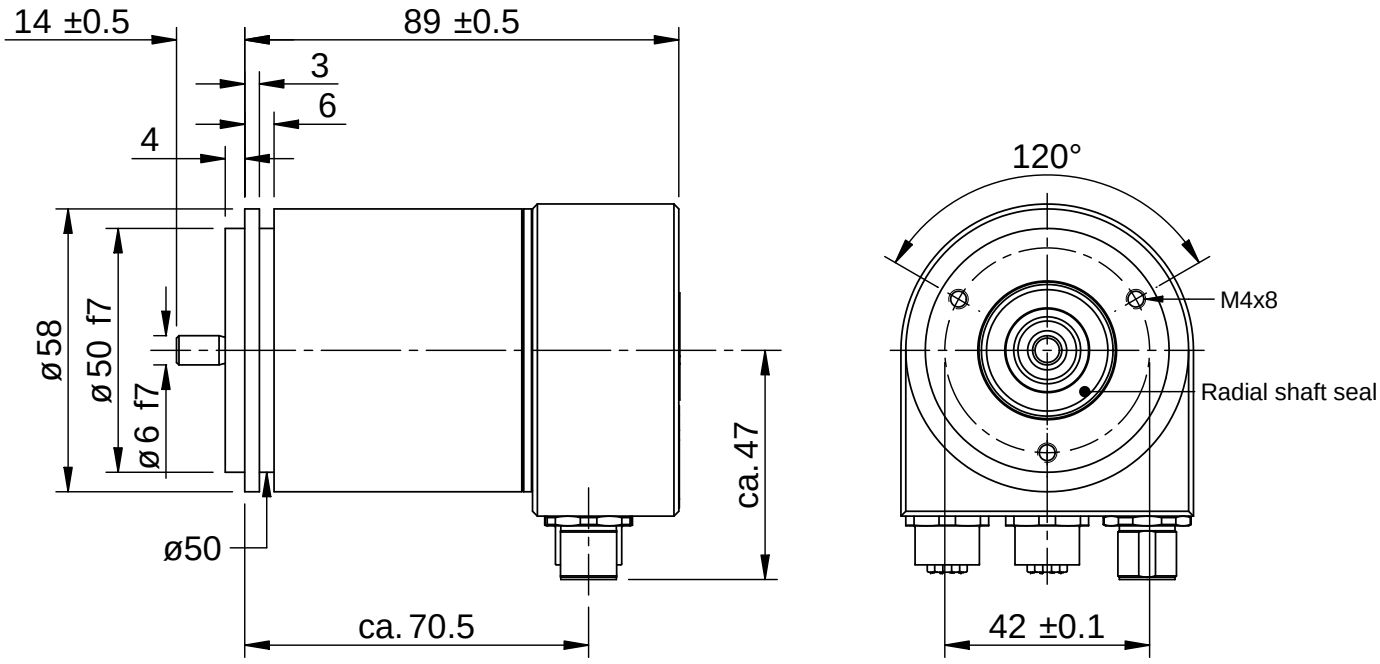

### REAR VIEW WITH CABLE OUTPUT



## INSTALLATION DRAWINGS

### FURTHER DESIGN FORMS
### DESIGN FORM 58 WITH SYNCHRONIZER FLANGE, ORDER NUMBER: TRK58-SA 4096 R 4096 C1 M K01

Dimensions in mm

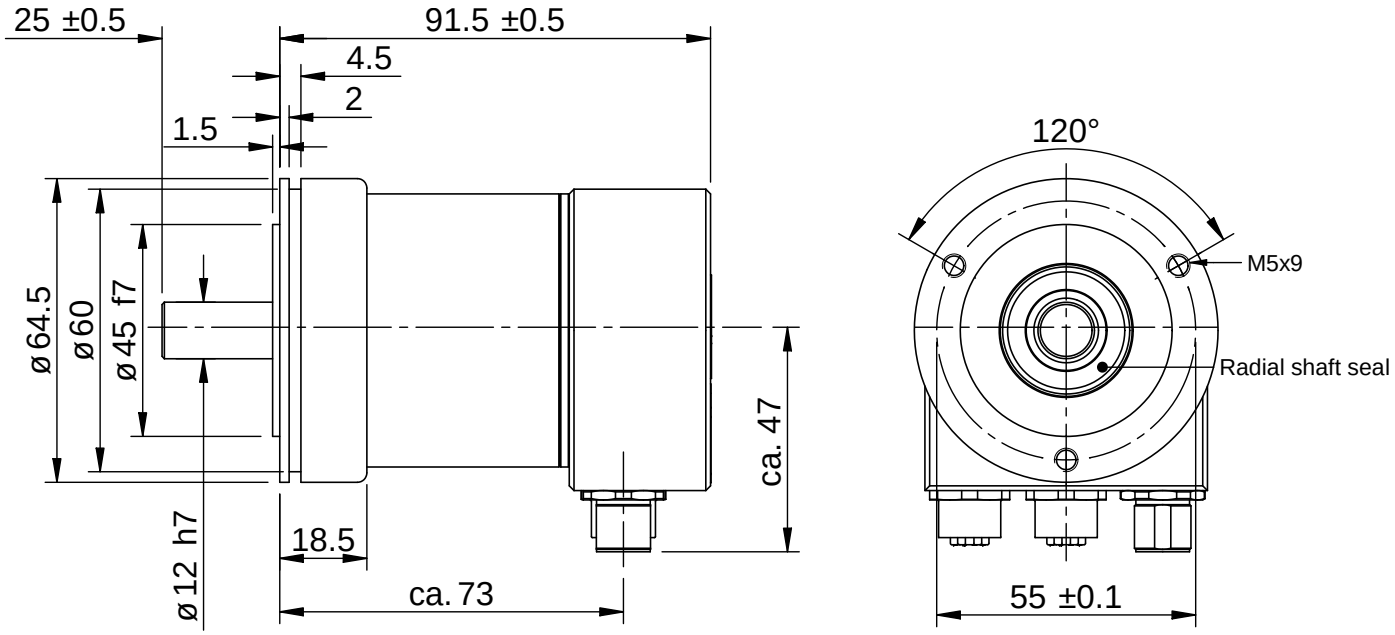


## INSTALLATION DRAWINGS

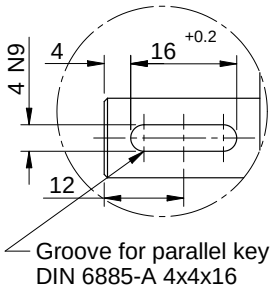
### DESIGN FORM 65 WITH SYNCHRONIZER FLANGE, ORDER NUMBER: TRK65-SA 4096 R 4096 C1 M K01

Shaft ø 12 mm

Dimensions in mm



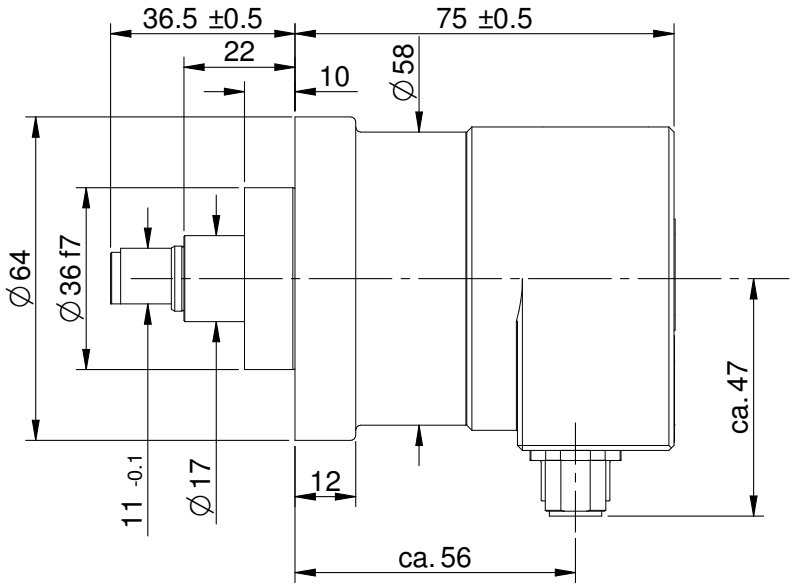

### OPTIONAL:
### SHAFT "P" WITH GROOVE AND FITTED SPRING

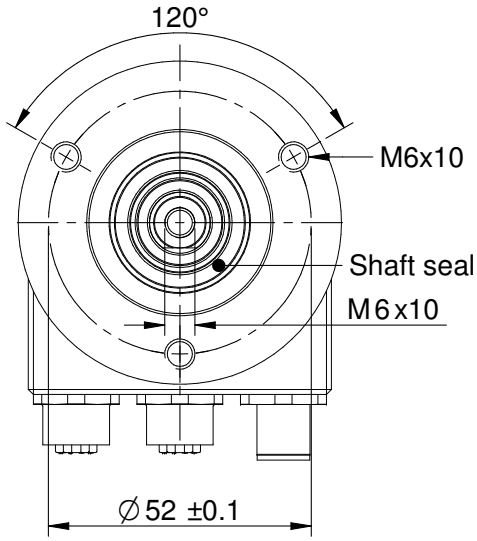


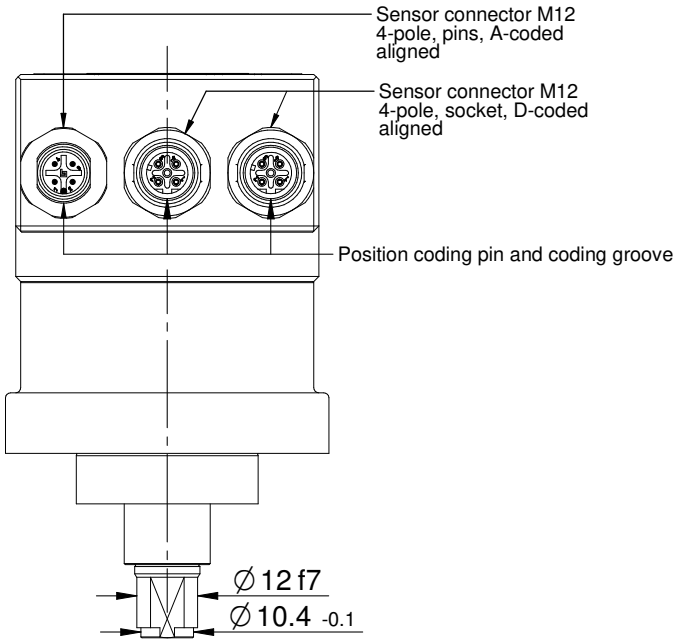
## INSTALLATION DRAWINGS

### DESIGN FORM 64 WITH CAM SWITCH FLANGE, ORDER NUMBER: TRK64-NZA 4096 R 4096 C1 M K01

Dimensions in mm



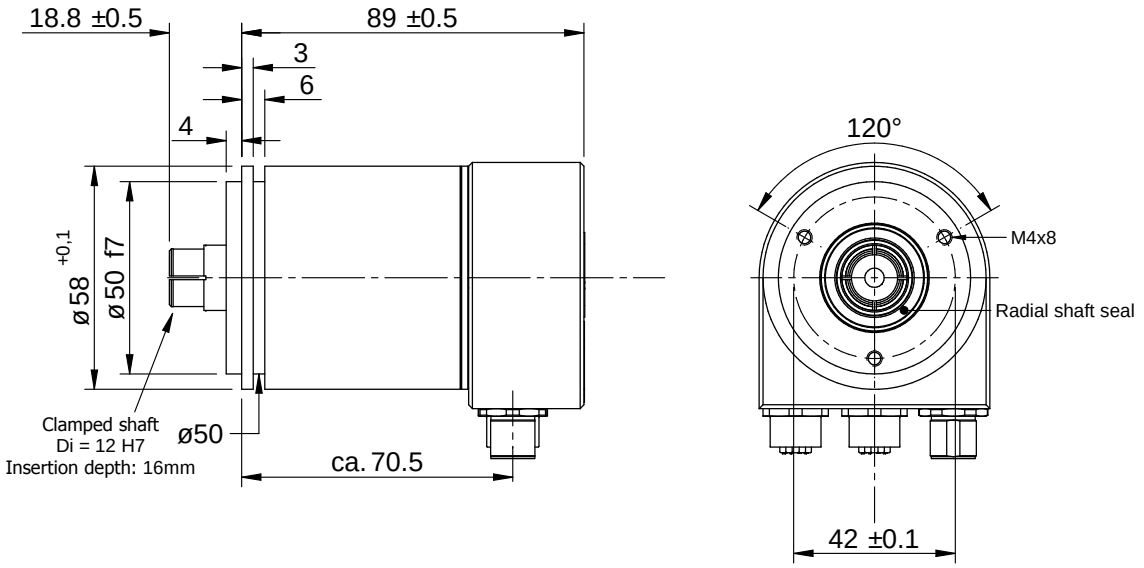



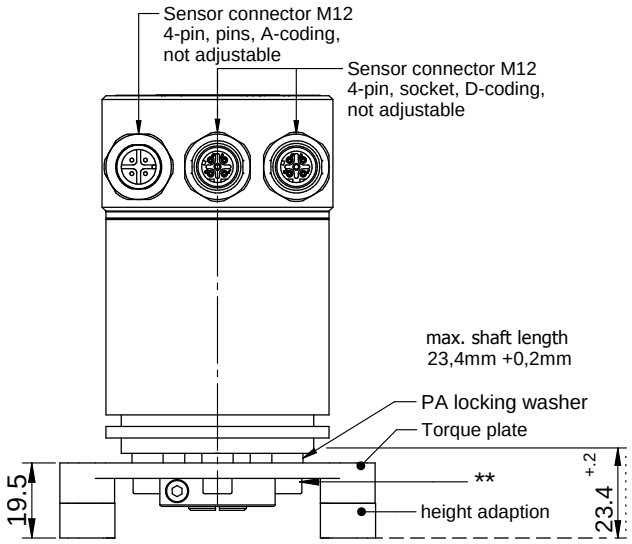



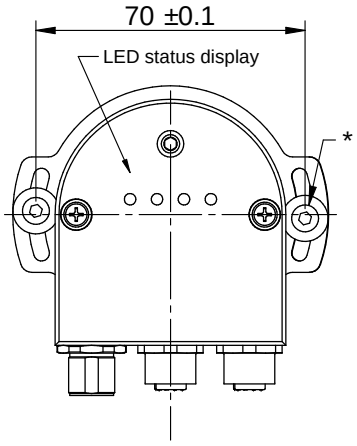
## INSTALLATION DRAWINGS

### DESIGN FORM 58 WITH SYNCHRONIZER FLANGE AND CLAMPING SHAFT (OPTION: TORQUE PLATE ZMS), ORDER NUMBER: TRK58-SRA 4096 R 4096 C1 M K01

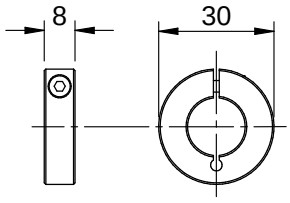
Dimensions in mm



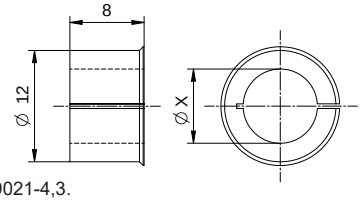




clamping ring (Aluminium)




### REDUCING BUSH (PLEASE ORDER SEPARATLY)

Ordering code: ZRH-A-12-X
X = 6, 6,35, 8, 9,53, 10




* 2x screw DIN 912 M4x30 (VA) with 2x locking washer (VA) and 2x flat washer DIN 9021-4,3.
** 3x screw DIN 912 M4x10 (VA) with 3x locking washer (VA).