



HEIDENHAIN



Product Information

ERO 2000 Series

Angle Encoders

Without Integral Bearing

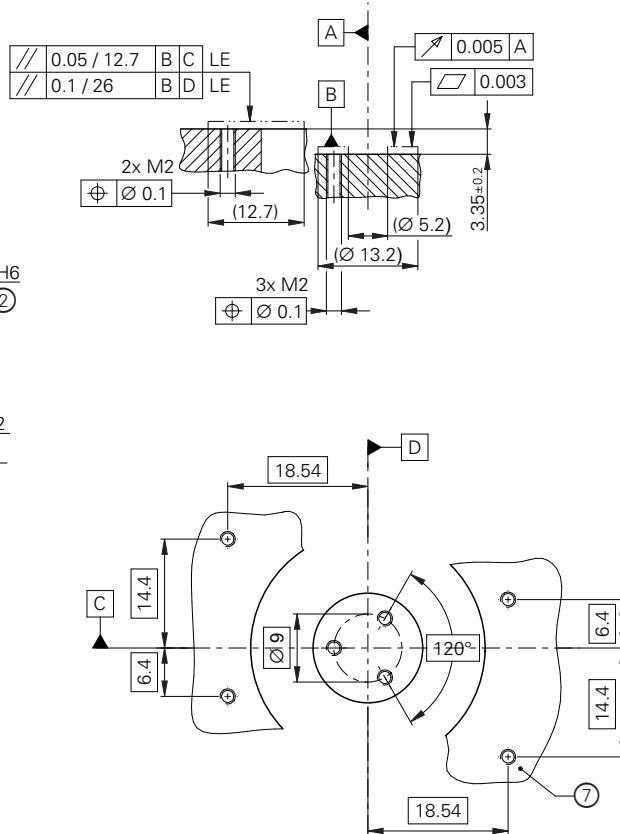
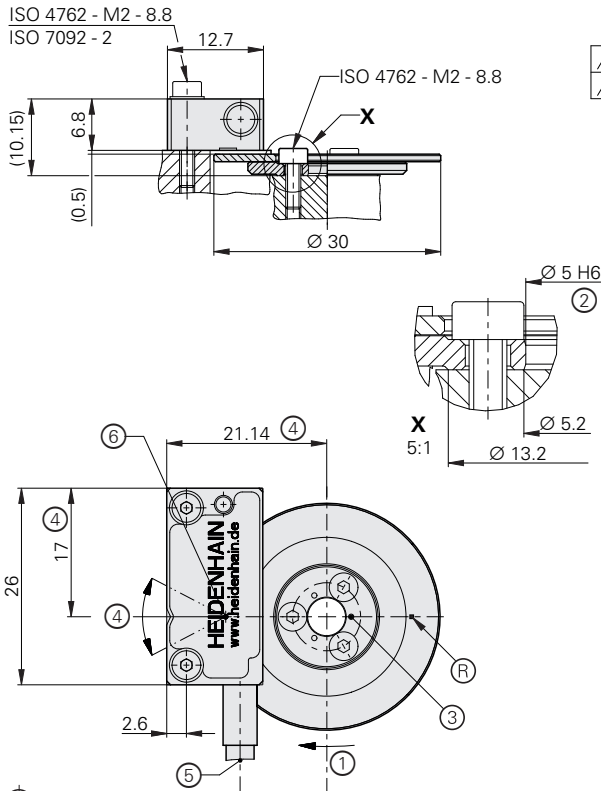
ERO 2000 series

- High resolution and accuracy
- Low mass and low mass moment of inertia
- Consisting of an AK scanning head and TKN circular scale
- TKN segment versions with position detection via homing track



Graduation carrier Ø 30 mm

Required mating dimensions



mm
Tolerancing ISO 8015
ISO 2768 - m H
< 6 mm: ±0.2 mm

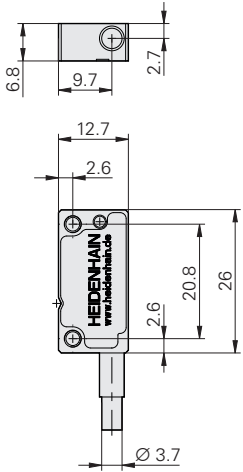
- ▣ = Bearing
- ⊙ = Reference mark
- 1 = Positive direction of rotation
- 2 = Centering collar
- 3 = Marks for circular scale centering (3x120°)
- 4 = Fine adjustment of the scanning head for obtaining optimal incremental signals
- 5 = Alternative cable outlet and connector are available
- 6 = Optical center point
- 7 = For centering of circular scale with two scanning heads

LE = Line element (ISO 1101: 2008)

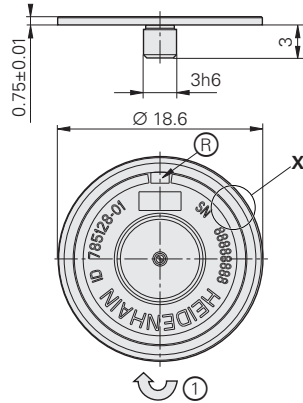


Graduation carrier \varnothing 18.6 mm (segment version: 18.6 mm x 9 mm)

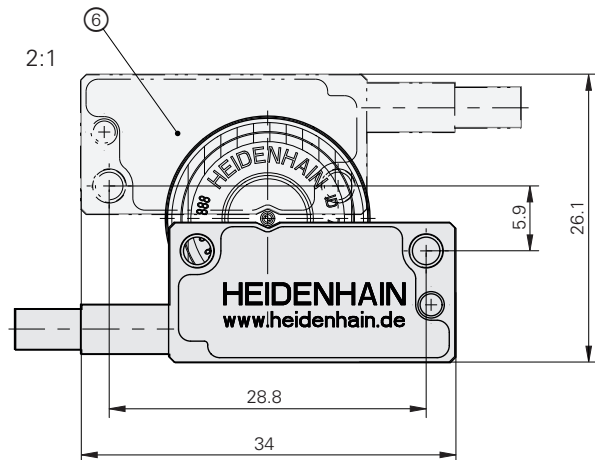
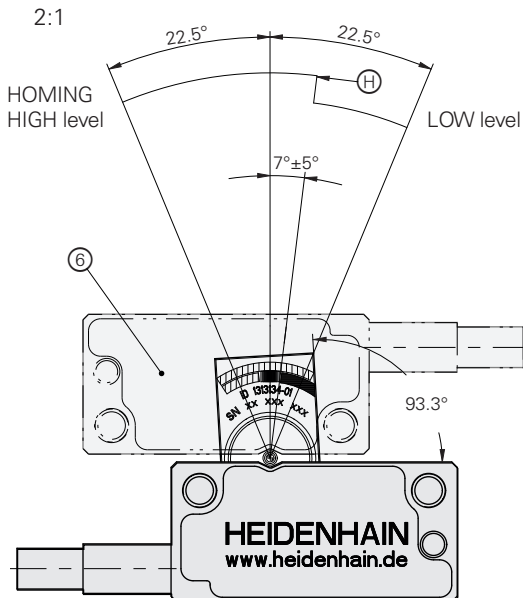
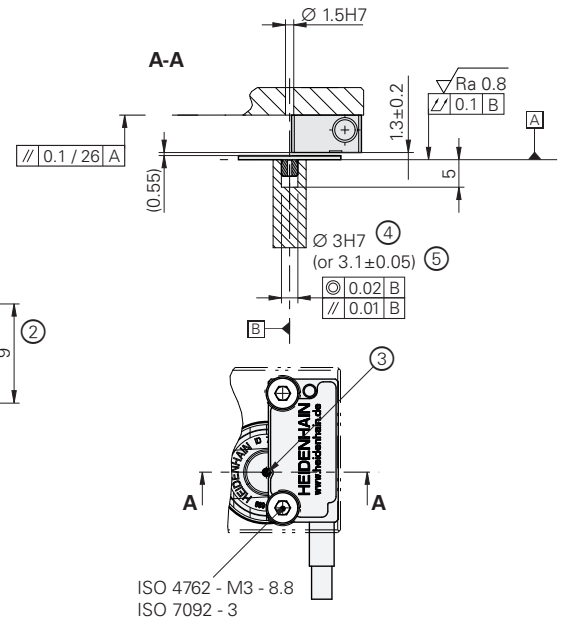
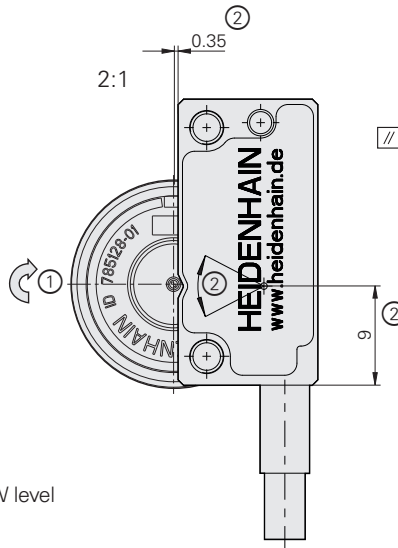
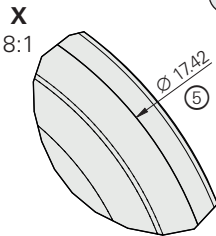
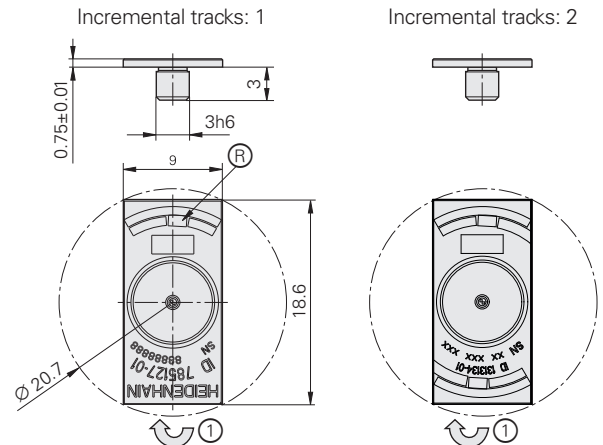
AK ERO 20x0



TKN ERO 2000
2:1



TKN ERO 2002
2:1




- ⊠ = Bearing of mating shaft
- ⊕ = Signal edge of the homing track
- R = Position of the reference mark
- 1 = Direction of shaft rotation for ascending position values
- 2 = Fine adjustment of the scanning head for optimal incremental signals
- 3 = Cylindrical pin for positioning and Moiré adjustment (must be removed after positioning)
- 4 = Dimension for alignment of the circular scale via the centering pin of the graduated disk
- 5 = Dimension for mounting the graduated disk via optical alignment;
do not use the outer glass edge of the graduated disk
- 6 = Optional: mounting with two scanning heads

mm

 Tolerancing ISO 8015
 ISO 2768 - m H
 <math>< 6\text{ mm}</math>: $\pm 0.2\text{ mm}$

Specifications

| | |
|--|--|
| Scanning head | AK ERO 2080 |
| Interface |  1 V _{PP} |
| Reference mark signal | Square-wave pulse |
| Cutoff frequency -3 dB ¹⁾ | ≥ 1 MHz |
| Electrical connection* | 15-pin D-sub connector (male) with 0.5 m/1 m/1.5 m/3 m cable 12-pin SHR-12V-S connector (female) with 0.5 m/1 m/1.5 m/3 m cable Cable outlet on the left or right and straight or angled |
| Cable length | With HEIDENHAIN cable: ≤ 20 m; during signal adjustment with the PWM 21: ≤ 3 m |
| Supply voltage | DC 5 V ±0.5 V |
| Current consumption | ≤ 150 mA (without load) |
| Vibration 55 Hz to 2000 Hz Shock 6 ms | ≤ 500 m/s ² (EN 60068-2-6) ≤ 1000 m/s ² (EN 60068-2-27) |
| Operating temperature | -10 °C to 70 °C |
| Protection | IP50 |
| Mass | Scanning head ≈ 5 g (without cable) Connector ≤ 75 g Cable ≈ 22 g/m |

* Please select when ordering

¹⁾ Maximum frequency during referencing: 500 kHz

| Circular scale | TKN ERO 2000 (full circle) | | TKN ERO 2002 ¹⁾ (segment) | |
|--|-----------------------------------|-----------------------------------|--------------------------------------|-------------------|
| Measuring standard | SUPRADUR graduation on glass | | | |
| Measuring range | 360° | | 45° | |
| Signal periods | 4096 | 2500 | 2500 over 360° | |
| Accuracy of graduation ²⁾ | ±8'' | ±10'' | – | – |
| Position error per signal period ³⁾ | ±0.3'' | ±0.5'' | ±0.5'' | |
| Position noise RMS (1 MHz) | 0.03'' | 0.04'' | 0.04'' | |
| Reference marks | One | | One | One on every side |
| Inside diameter of hub | 5 mm | – | – | |
| Dimensions of graduation carrier | ∅ 30 mm | ∅ 18.6 mm | 18.6 mm x 9 mm | |
| Centering pin | – | 3 mm | 3 mm | |
| Mech. permissible shaft speed | ≤ 14000 rpm | ≤ 24000 rpm | | |
| Moment of inertia | $4.1 \cdot 10^{-7} \text{ kgm}^2$ | $2.2 \cdot 10^{-8} \text{ kgm}^2$ | $1.1 \cdot 10^{-8} \text{ kgm}^2$ | |
| Protection EN 60529 | Complete, mounted encoder: IP00 | | | |
| Mass | ≈ 5.2 g | ≈ 0.56 g | ≈ 0.36 g | |

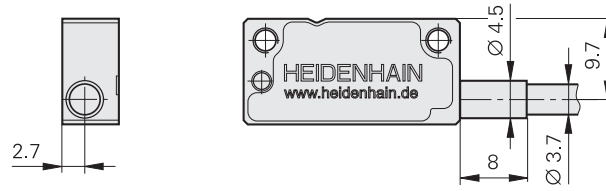
¹⁾ Along with their incremental graduation, the TKN ERO 2002 segment versions feature a homing track for position detection (see ⊕ in mating dimensions). The signal for position detection from the scanning head is transmitted in the TTL level via a separate line and is therefore directly available. The incremental signals correspond to the V_{PP} interface.

²⁾ When centered with two scanning heads

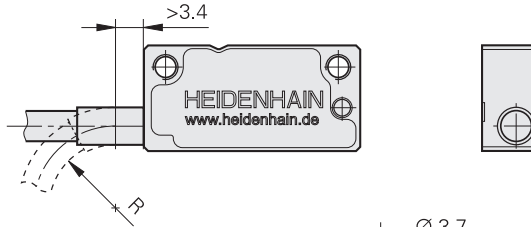
³⁾ The position error within one signal period and the accuracy of the graduation together yield the encoder-specific error; for additional mounting and bearing errors of the measured shaft, see *Measuring accuracy* in the *Modular Angle Encoders With Optical Scanning* brochure.

Cable outlets

Cable outlet on the right



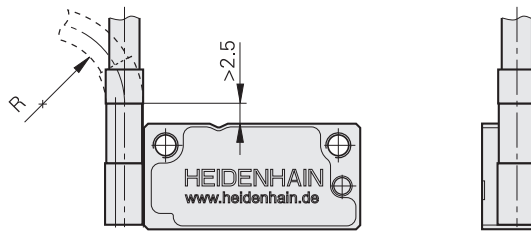
Cable outlet on the left



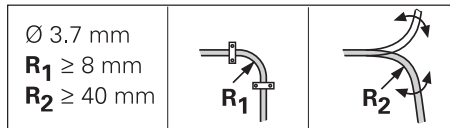
Cable outlet on the right at angle of 0°



Cable outlet on the left at angle of 0°

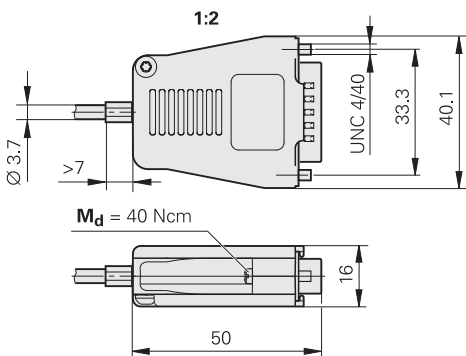


Cable bend radius **R**

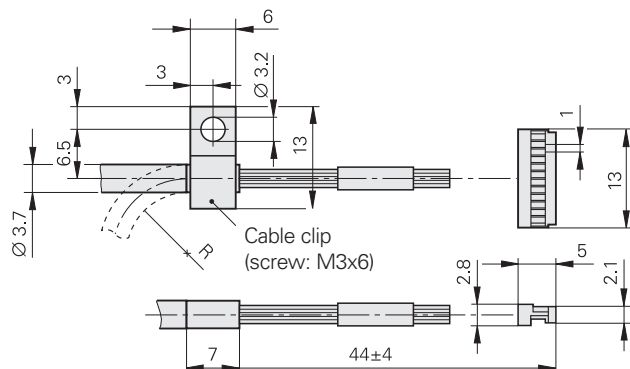


Connectors

D-sub $\sim 1 V_{PP}$


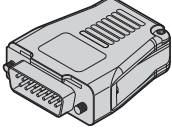
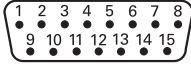


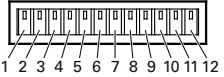






SHR-12V-S $\sim 1 V_{PP}$



Electrical connection

Pin layout

| 15-pin D-sub connector (male) | | | | | 12-pin SHR-12V-S connector (female) | | | | | | | | | |
|---|---|---|-----------------|--------------|---|--|---|------|-----|-------|----------------------|-----------------|------------------|----------------------|
|  |  |  | | |  |  |  | | | | | | | |
| | Power supply | | | | Incremental signals | | | | | | Other signals | | | |
|  | 4 | 12 | 2 | 10 | 1 | 9 | 3 | 11 | 14 | 7 | 13 | 8 | 6 | 15 |
|  | 1 | - | 2 | - | 3 | 4 | 6 | 5 | 8 | 7 | 9 | 12 | 10 | 11 |
|  | U_P | Sensor U_P | 0V | Sensor 0V | A+ | A- | B+ | B- | R+ | R- | Vacant ¹⁾ | H | / | Vacant ¹⁾ |
|  | Brown/ Green | / | White/ Green | / | Brown | Green | Gray | Pink | Red | Black | Violet | Green/ Black | Yellow/ Black | Yellow |






Shield on housing; **U_P** = Power supply voltage

Sensor: The sense line is connected in the connector with the corresponding power line.

Vacant pins or wires must not be used.

¹⁾ Required for signal adjustment with the PWM 21

Adapter cables and connecting cables

| | | | |
|---|--|-------------------------|-------------------------|
| PUR 6 x (2 x 0.19 mm ²); A _P = 2 x 0.19 mm ² | | | |
| PUR 4 x (2 x 0.16 mm ²) + (4 x 0.5 mm ²); A _P = 2 x 0.5 mm ² | | Ø 8 mm | Ø 6 mm ¹⁾ |
| Adapter cable with 15-pin D-sub connector (female) and 12-pin M23 connector (male) |  | 331693-xx ²⁾ | 355215-xx ²⁾ |
| Adapter cable with 15-pin D-sub connector (female) and 15-pin D-sub connector (male) |  | 354379-xx ³⁾ | 355397-xx ³⁾ |
| Connecting cable with 15-pin D-sub connector (female) and stripped cable end |  | 354411-xx ³⁾ | 355398-xx ³⁾ |
| Connecting cable with 15-pin D-sub connector (female) and 15-pin D-sub connector (female) with pin layout for the IK 220 |  | 335077-xx ²⁾ | 349687-xx ²⁾ |
| Signal cable with stripped cable ends (15-polig) ⁴⁾ |  | 816317-xx | 816323-xx |

1) Cable length for Ø 6 mm: max. 9 m

2) Without homing

3) With homing

4) Cable design: 4 x (2 x 0.14 mm²) + (4 x 0.5 mm²)

A_P: Cross section of supply lines

Accessory

Adapter connector from SHR-12-V-S to D-sub for signal comparison with PWM 21

ID 1234385-01

HEIDENHAIN

DR. JOHANNES HEIDENHAIN GmbH

Dr.-Johannes-Heidenhain-Straße 5

83301 Traunreut, Germany

☎ +49 8669 31-0

☎ +49 8669 32-5061

E-mail: info@heidenhain.de

www.heidenhain.de

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Further information:

Comply with the requirements described in the following documents to ensure correct and intended operation:

- Brochure: *Modular Angle Encoders with Optical Scanning* 1222041-xx
- Brochure: *Interfaces of HEIDENHAIN Encoders* 1078628-xx
- Brochure: *Cables and Connectors* 1206103-xx