HEIDENHAIN

Product Information

ERO 2000 Series

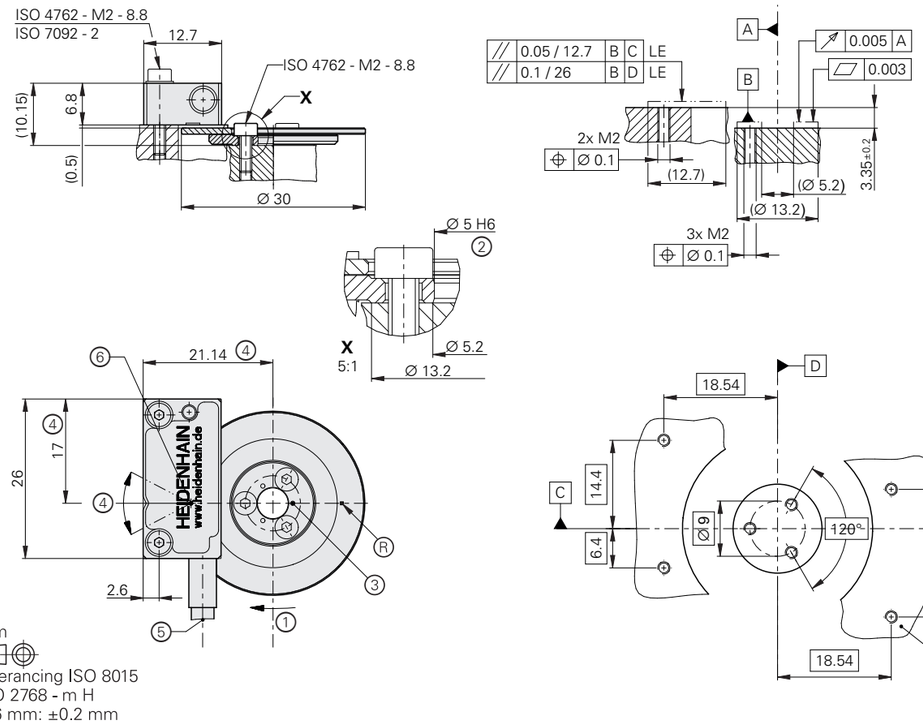
Angle Encoders
Without Integral Bearing

01/2022

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

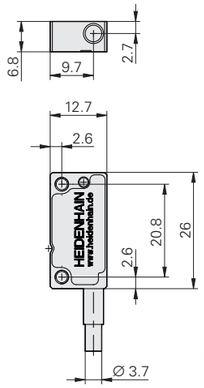
Tolerancing ISO 8015
ISO 2768 - m H
< 6 mm: ±0.2 mm

Ⓐ = 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

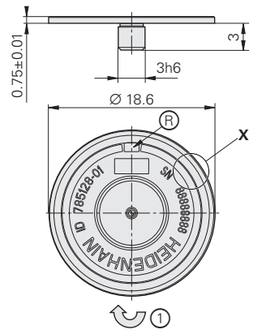
LE = Line element (ISO 1101: 2008)

Graduation carrier Ø 18.6 mm (segment version: 18.6 mm x 9 mm)

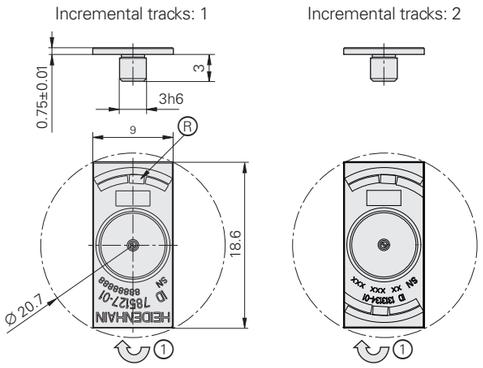
AK ERO 20x0

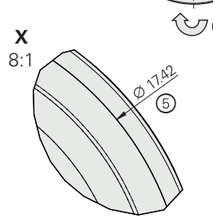


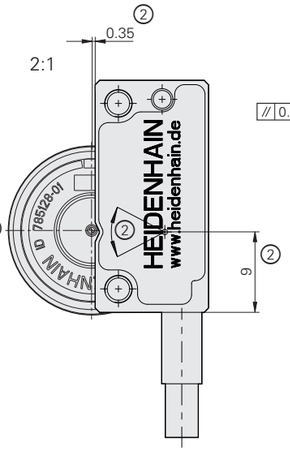
TKN ERO 2000
2:1

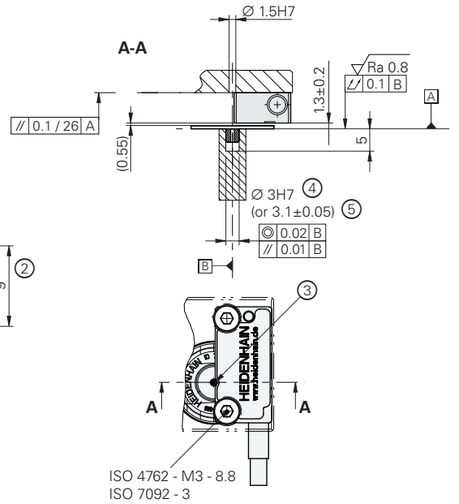


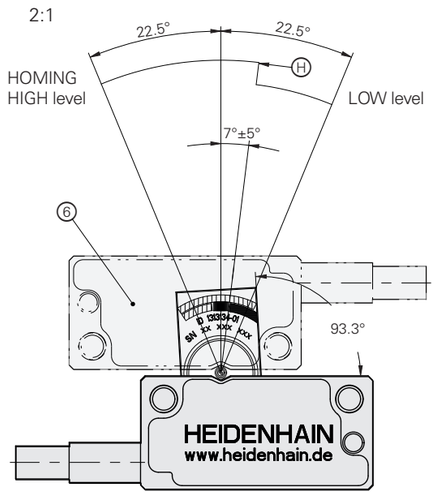
TKN ERO 2002
2:1

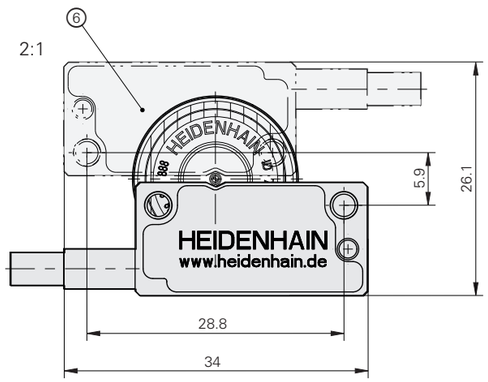












Ⓑ = Bearing of mating shaft
Ⓗ = Signal edge of the homing track
R = Position of the reference mark
1 = Direction of shaft rotation for ascending position values
2 = Fine adjustment of the scanning head for optimal incremental signals
3 = Cylindrical pin for positioning and Moiré adjustment (must be removed 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
< 6 mm: ±0.2 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/s² (EN 60068-2-6) ≤ 1000 m/s² (EN 60068-2-27)
Operating temperature		–10 °C to 70 °C
Protection		IP50
Mass	Scanning head Connector Cable	≈ 5 g (without cable) ≤ 75 g ≈ 22 g/m

* Please select when ordering
1) Maximum frequency during referencing: 500 kHz

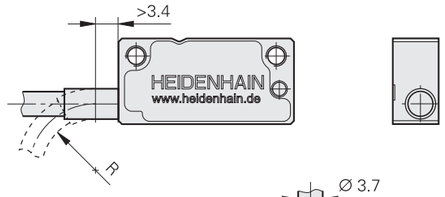
Circular scale	TKN ERO 2000 (full circle)		TKN ERO 2002[1)] (segment)	
Measuring standard	SUPRADUR graduation on glass			
Measuring range	360°		45°	
Signal periods	4096	2500	2500 over 360°	
Accuracy of graduation[2)]	±8″	±10″	–	–
Position error per signal period[3)]	±0.3″	±0.5″	±0.5″	
Position noise 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	Ø 30 mm	Ø 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	$4.1 \cdot 10^{-7}$ kgm²	$2.2 \cdot 10^{-8}$ kgm²	$1.1 \cdot 10^{-8}$ kgm²	
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.

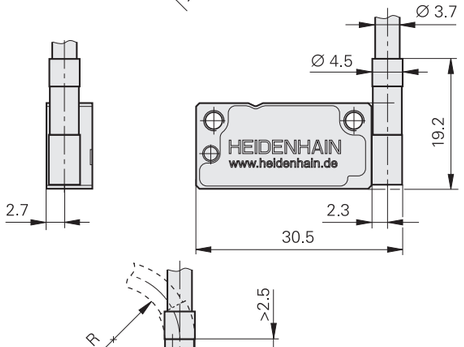
Cable outlets

Cable outlet on the right

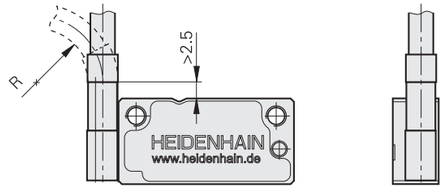
Cable outlet on the left



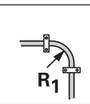
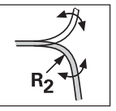
Cable outlet on the right at angle of 0°



Cable outlet on the left at angle of 0°

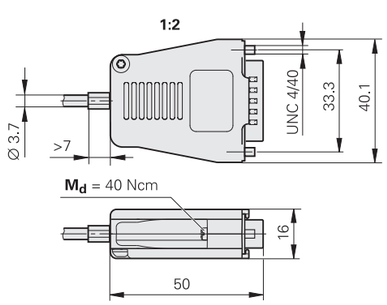


Cable bend radius **R**

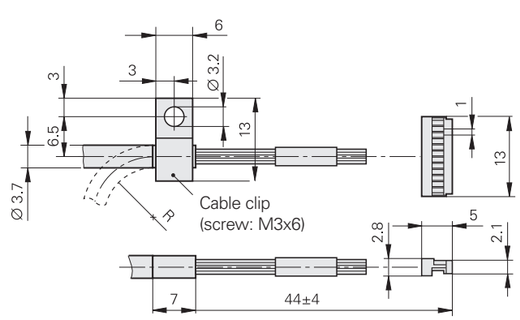
Ø 3.7 mm **R_1** ≥ 8 mm **R_2** ≥ 40 mm		

Connectors

D-sub ~ 1 V_{PP}



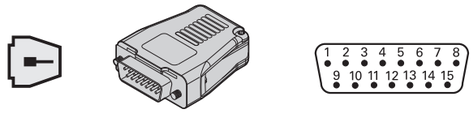
SHR-12V-S ~ 1 V_{PP}



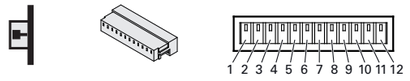
Electrical connection

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**
~ 1 V_{PP}	**U_P**	**Sensor** U_P	**0 V**	**Sensor** 0 V	**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 mm²); A_P = 2 x 0.19 mm²			
PUR 4 x (2 x 0.16 mm²) + (4 x 0.5 mm²); A_P = 2 x 0.5 mm²		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

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This Product Information document supersedes all previous editions, which thereby become invalid. The basis for ordering from HEIDENHAIN is always the Product Information document edition valid when the order is placed.

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

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