



HEIDENHAIN



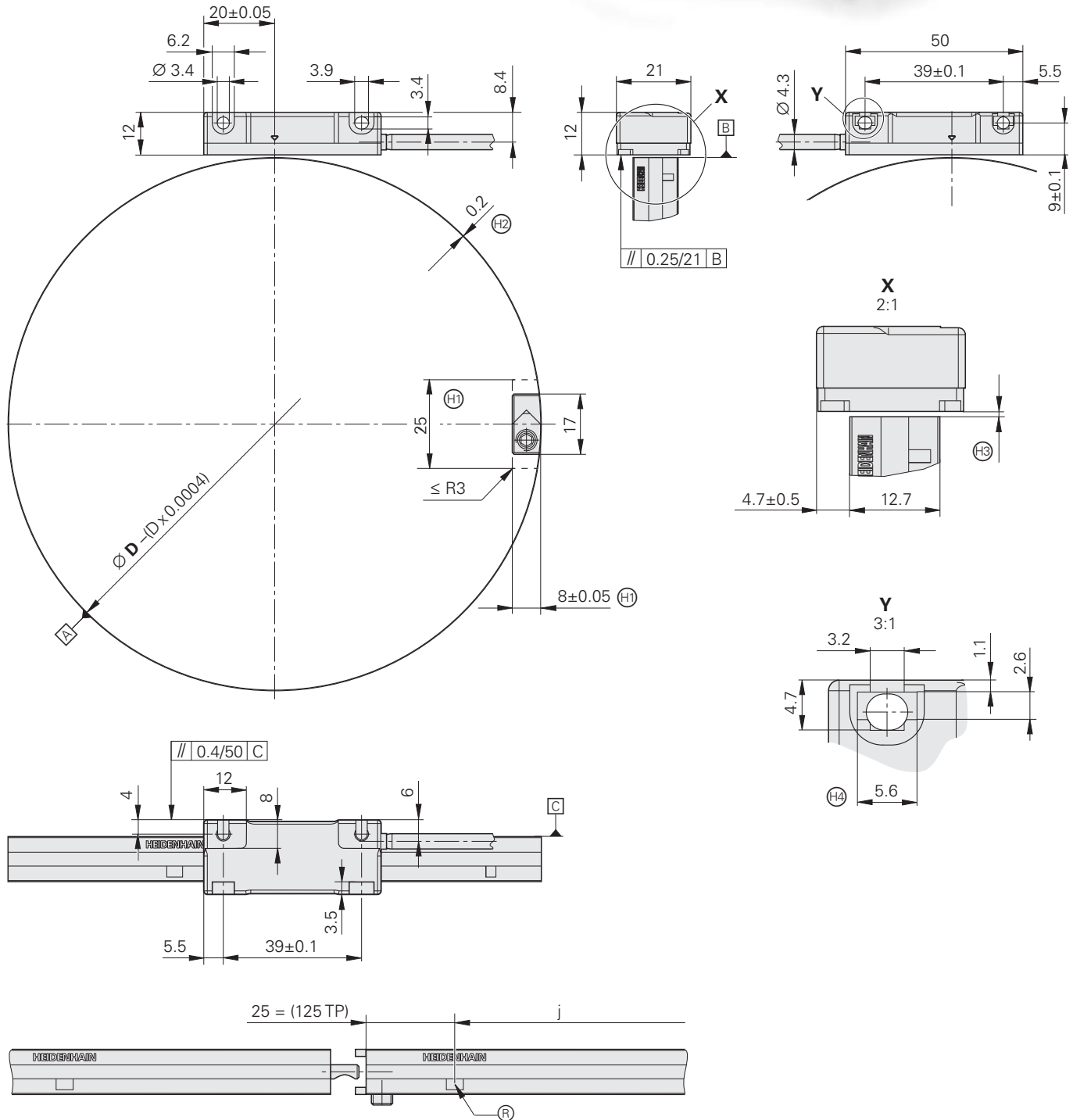
Preliminary Product
Information

ERA 6000 Series Angle Encoders without Integral Bearing

February 2009

ERA 6000 Series

- Steel scale tape as graduation carrier
- For outside diameters
- Full-circle version with tensioning cleat







- D** = Shaft diameter
 TP= Grating period 200 μ m
 j = Additional reference marks spaced every n x 100 mm
 [A] = Bearing
 [R] = Reference mark
 [H1] = Space for tensioning cleat
 [H2] = Scale-tape thickness
 [H3] = $D < \varnothing 500 = 0.75 + 0.2 / -0.1$
 $D \geq \varnothing 500 = 0.75 + 0.4 / -0.2$
 [H4] = Hexagonal nut as per ISO 4032-M3 SW5.6

Dimensions in mm



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

Specifications

Scanning head	ERA 6080		ERA 6070	
Incremental signals	 1 V _{PP}	 TTL x 10	 TTL x 50	 TTL x 100
Integrated interpolation*	–	10-fold	50-fold	100-fold
Cutoff frequency –3 dB	≥ 90 kHz	–	–	–
Scanning frequency	–	≤ 50 kHz	≤ 25 kHz	≤ 12.5 kHz
Edge separation a	–	≥ 0.465 μs	≥ 0.175 μs	≥ 0.175 μs
Power supply	5 V ± 5 %			
Current consumption (without load)	< 110 mA	< 140 mA		
Electrical connection	Cable 3 m with D-sub connector (15-pin)			
Cable length	≤ 30 m (with HEIDENHAIN cable)			
Vibration 55 to 2000 Hz Shock 11 ms	≤ 200 m/s ² ≤ 500 m/s ²			
Operating temperature	0 to 50 °C			
Protection EN 60529	IP 00			
Weight	Scanning head Connector Cable	20 g (without cable) 32 g 30 g/m	20 g (without cable) 140 g 30 g/m	

Scale tape	ERA 6000				
Measuring standard Expansion coefficient	Steel scale tape $\alpha_{\text{therm}} \approx 10 \cdot 10^{-6} \text{ K}^{-1}$				
Scale-slot diameter*	159.07 mm	229.15 mm	318.34 mm	636.88 mm	1 146.54 mm
Line count ¹⁾	2500	3600	5000	10000	18000
Reference marks	Selectable every 100 mm				
System accuracy ²⁾	± 150"	± 110"	± 80"	± 40"	± 22"
Accuracy of the graduation ³⁾	± 30 μm/m"				
Shaft speed ⁴⁾	200 min ⁻¹	200 min ⁻¹	200 min ⁻¹	150 min ⁻¹	85 min ⁻¹
Permissible axial motion	≤ 0.5 mm (scale tape relative to scanning head)				
Permissible expansion coefficient of shaft	$\alpha_{\text{therm}} = 9 \cdot 10^{-6} \text{ K}^{-1}$ to $12 \cdot 10^{-6} \text{ K}^{-1}$				
Weight	Scale tape	12 g + 20 g/m			

* Please indicate when ordering

¹⁾ Other line counts upon request (minimum 2350; maximum 18000)

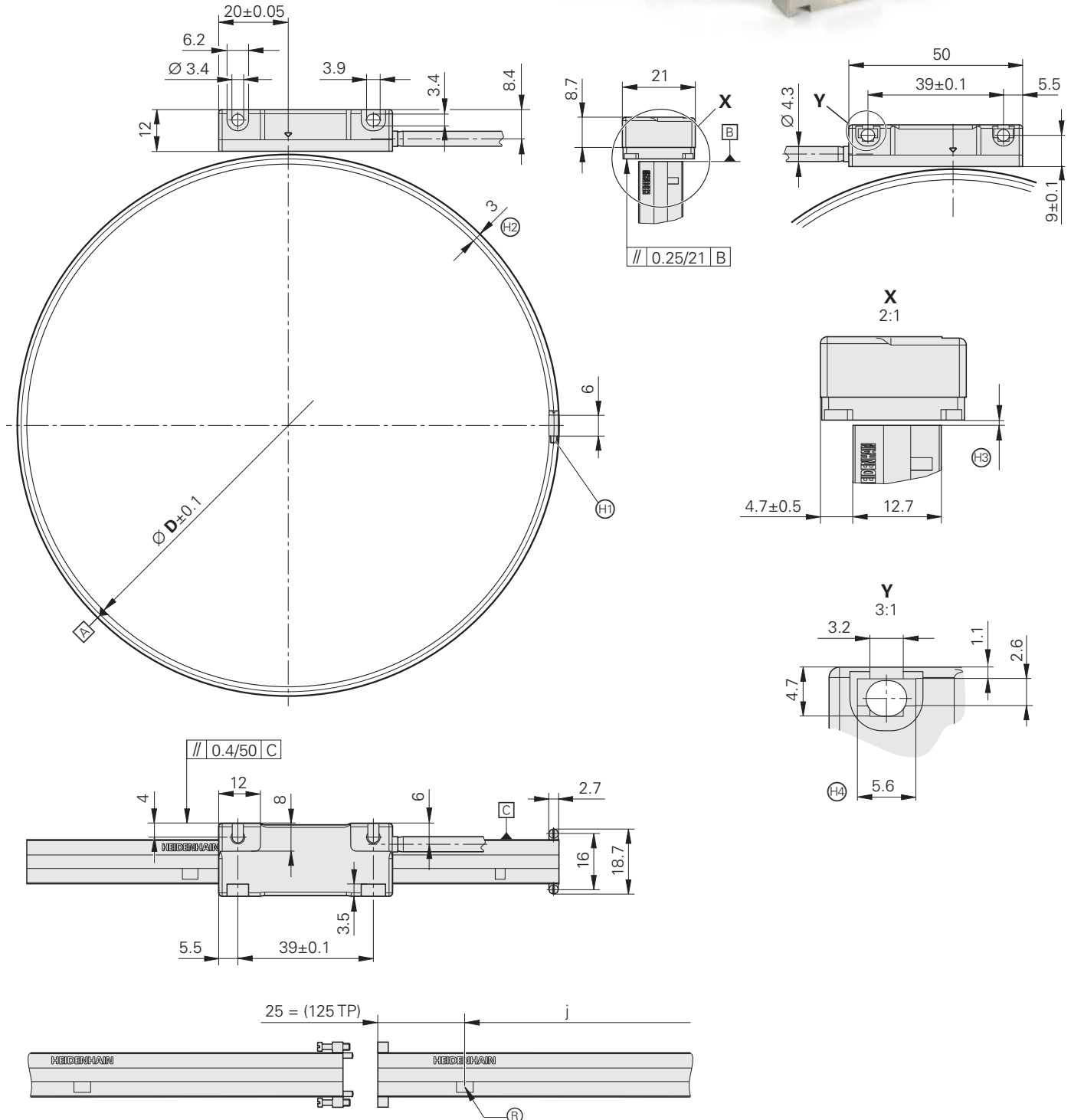
²⁾ Before installation. Additional errors caused by mounting inaccuracy and inaccuracy from the bearing of the drive shaft are not included.

³⁾ For other errors, see *Measuring Accuracy* in the brochure *Angle Encoders without Integral Bearing*

⁴⁾ Higher speeds available upon request

ERA 6006 Series

- Steel scale tape as graduation carrier
- For outside diameters
- Full-circle version with tensioning cleat
- Scale tape with elastic intermediate layer for large diameter tolerances and low surface quality







- D** = Shaft diameter
 TP = Grating period 200 µm
 j = Additional reference marks spaced every n x 100 mm
 A = Bearing
 R = Reference mark
 H1 = M2 tensioning screw
 H2 = Scale-tape thickness
 H3 = $D < \text{Ø } 500 = 0.75 + 0.2 / -0.1$
 $D \geq \text{Ø } 500 = 0.75 + 0.4 / -0.2$
 H4 = Hexagonal nut as per ISO 4032-M3 SW5.6

Dimensions in mm



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

Specifications

Scanning head	ERA 6080		ERA 6070	
Incremental signals	 1 V _{PP}	 TTL x 10	 TTL x 50	 TTL x 100
Integrated interpolation*	–	10-fold	50-fold	100-fold
Cutoff frequency –3 dB	≥ 90 kHz	–	–	–
Scanning frequency	–	≤ 50 kHz	≤ 25 kHz	≤ 12.5 kHz
Edge separation a	–	≥ 0.465 μs	≥ 0.175 μs	≥ 0.175 μs
Power supply	5 V ± 5 %			
Current consumption (without load)	< 110 mA	< 140 mA		
Electrical connection	Cable 3 m with D-sub connector (15-pin)			
Cable length	≤ 30 m (with HEIDENHAIN cable)			
Vibration 55 to 2000 Hz Shock 11 ms	≤ 200 m/s ² ≤ 500 m/s ²			
Operating temperature	0 to 50 °C			
Protection EN 60529	IP 00			
Weight	Scanning head Connector Cable	20 g (without cable) 32 g 30 g/m	20 g (without cable) 140 g 30 g/m	

Scale tape	ERA 6006				
Measuring standard Expansion coefficient	Steel scale tape $\alpha_{\text{therm}} \approx 10 \cdot 10^{-6} \text{ K}^{-1}$				
Scale-slot diameter*	153.35 mm	223.38 mm	312.51 mm	630.82 mm	1 140.12 mm
Line count ¹⁾	2500	3600	5000	10000	18000
Reference marks	Selectable every 100 mm				
System accuracy ²⁾	± 400"	± 300"	± 210"	± 100"	± 60"
Accuracy of the graduation ³⁾	± 30 μm/m"				
Shaft speed ⁴⁾	200 min ⁻¹	200 min ⁻¹	200 min ⁻¹	150 min ⁻¹	85 min ⁻¹
Permissible axial motion	≤ 0.5 mm (scale tape relative to scanning head)				
Permissible thermal diameter change between shaft and scale tape	≤ ± 0.2 mm				
Weight	Scale tape	2.5 g + 45 g/m			

* Please indicate when ordering

¹⁾ Other line counts upon request (minimum 2350; maximum 18000)

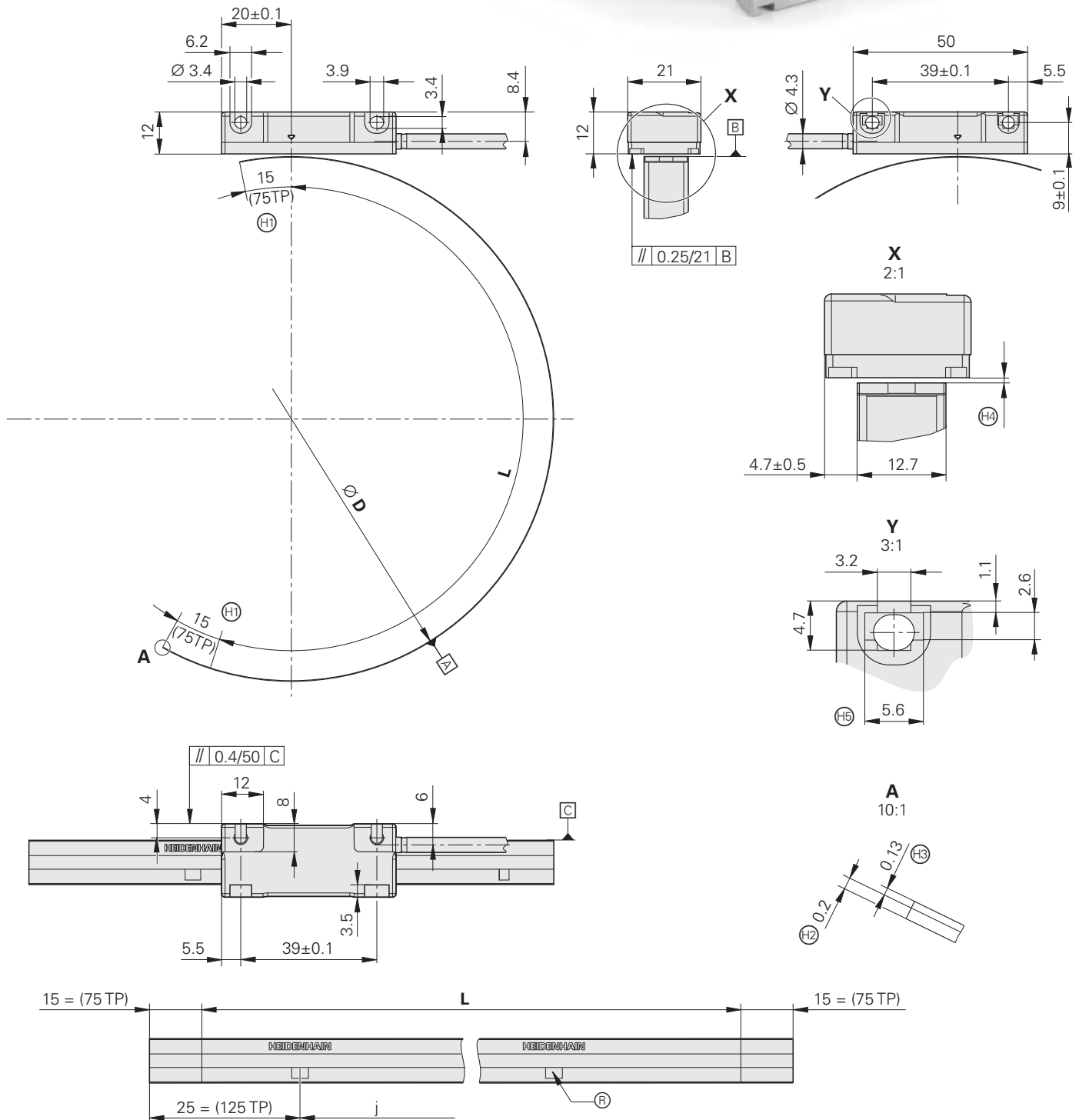
²⁾ Before installation. Additional errors caused by mounting inaccuracy and inaccuracy from the bearing of the drive shaft are not included.

³⁾ For other errors, see *Measuring Accuracy* in the brochure *Angle Encoders without Integral Bearing*

⁴⁾ Higher speeds available upon request

ERA 6002 Series

- Steel scale tape as graduation carrier
- For outside diameters
- Segment version
- Simple scale tape fastening by adhesive







- D** = Shaft diameter
L = Measuring range
 TP = Grating period 200 µm
 j = Additional reference marks spaced every n x 100 mm
 A = Bearing
 B = Reference mark
 C = Allowance
 D = Steel scale tape
 E = Adhesive tape
 F = $D < \varnothing 500 = 0.75 + 0.2 / -0.1$
 G = $D \geq \varnothing 500 = 0.75 + 0.4 / -0.2$
 H = Hexagonal nut as per ISO 4032-M3 SW5.6

Dimensions in mm

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

Specifications

Scanning head	ERA 6080		ERA 6070	
Incremental signals	 1 V _{PP}	 TTL x 10	 TTL x 50	 TTL x 100
Integrated interpolation*	–	10-fold	50-fold	100-fold
Cutoff frequency –3 dB	≥ 90 kHz	–	–	–
Scanning frequency	–	≤ 50 kHz	≤ 25 kHz	≤ 12.5 kHz
Edge separation a	–	≥ 0.465 μs	≥ 0.175 μs	≥ 0.175 μs
Power supply	5 V ± 5 %			
Current consumption (without load)	< 110 mA	< 140 mA		
Electrical connection	Cable 3 m with D-sub connector (15-pin)			
Cable length	≤ 30 m (with HEIDENHAIN cable)			
Vibration 55 to 2000 Hz Shock 11 ms	≤ 200 m/s ² ≤ 500 m/s ²			
Operating temperature	0 to 50 °C			
Protection EN 60529	IP 00			
Weight	Scanning head Connector Cable	20 g (without cable) 32 g 30 g/m	20 g (without cable) 140 g 30 g/m	

Scale tape	ERA 6002	
Measuring standard Expansion coefficient	Steel scale tape $\alpha_{\text{therm}} \approx 10 \cdot 10^{-6} \text{ K}^{-1}$	
Scale-slot diameter*	≥ 150 mm ¹⁾	
Line count*	Min. 300, max. 50 000 (5 lines/mm)	
Reference marks	Selectable every 100 mm	
Accuracy of the graduation ²⁾	± 30 μm/m	
Permissible axial motion	≤ 0.5 mm (scale tape relative to scanning head)	
Weight	Scale tape	20 g/m

* Please indicate when ordering

¹⁾ For mating diameters < 400 the scale tape is pre-bent

²⁾ For other errors, see *Measuring Accuracy* in the brochure *Angle Encoders without Integral Bearing*

Electrical Connection

Pin Layout

15-pin D-sub connector, male														
Power supply				Incremental signals						Other signals				
	4	12	2	10	1	9	3	11	14	7	13	8	6	15
	U_p	Sensor 5V	0V	Sensor 0V	U_{a1}	U_{a1}	U_{a2}	U_{a2}	U_{a0}	U_{a0}	U_{aS}	Vacant	Vacant	Vacant
	●-----●		●-----●		A+	A-	B+	B-	R+	R-	Vacant			
	Brown/ Green	Blue	White/ Green	White	Brown	Green	Gray	Pink	Red	Black	Violet	/	/	Yellow

Shield on housing; **U_p** = power supply voltage

Sensor: The sensor line is connected internally with the corresponding power line
Vacant pins or wires must not be used.

Connecting Cable

PUR connecting cable [6(2 x 0.19 mm ²)]			
PUR connecting cable [4(2 x 0.14 mm ²) + (4 x 0.5 mm ²)]		Ø 8 mm	Ø 6 mm ¹⁾
Complete with D-sub connector (female), 15-pin, and M23 connector (male), 12-pin		331 693-xx	355 215-xx
With one D-sub connector (female), 15-pin		332 433-xx	355 209-xx
Complete with D-sub connector (female) and D-sub connector (male), both 15-pin		335 074-xx	355 186-xx
Complete with D-sub connector (female) and D-sub connector (female), both 15-pin Assignment for IK 220		335 077-xx	349 687-xx
Cable only		244 957-01	291 639-01

¹⁾ Cable length for Ø 6 mm max. 9 m

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For more information

- Brochure: *Angle Encoders without Integral Bearing*