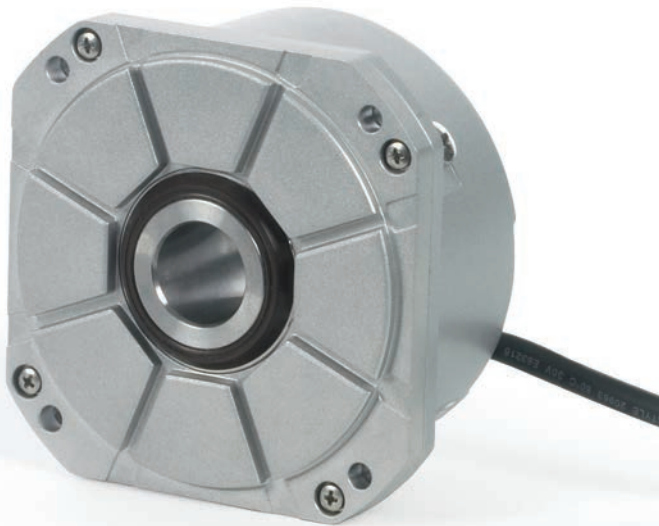




HEIDENHAIN



Product Information

RON 200

RON 700

RON 800

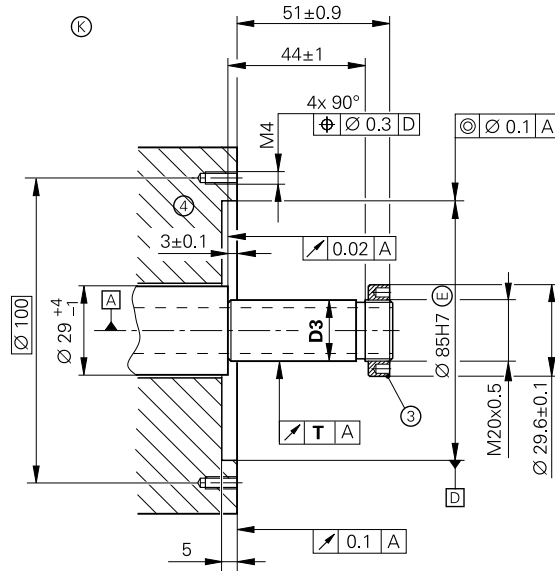
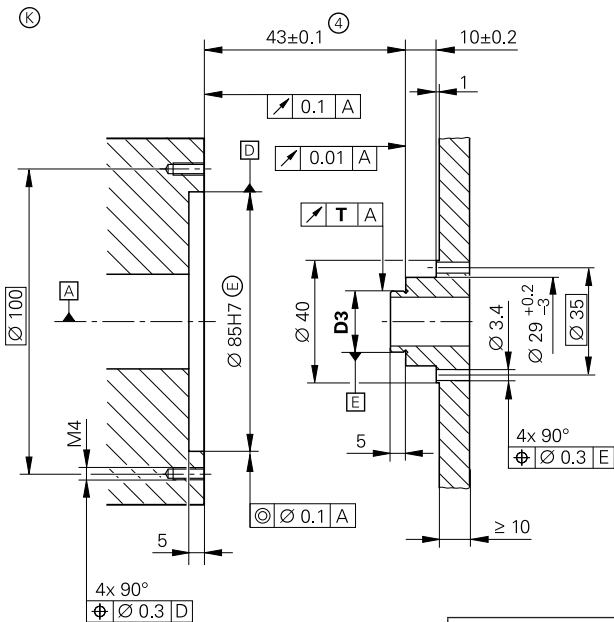
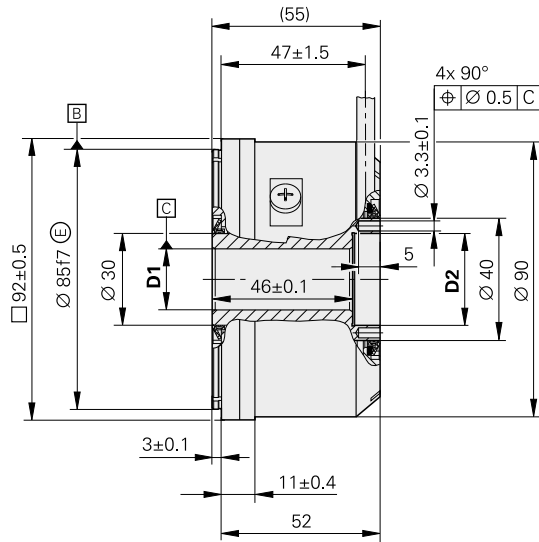
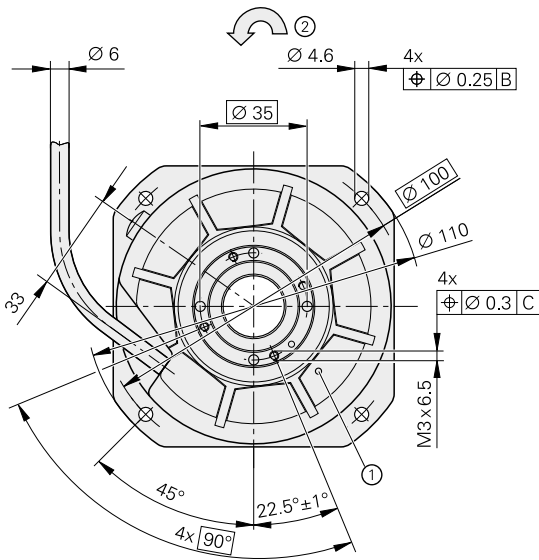
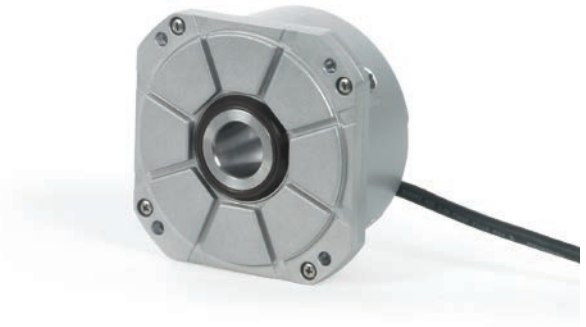
RPN 800

Incremental Angle Encoders
with Integral Bearing,
Hollow Shaft and
Stator Coupling

02/2023

RON 200 series

- Integrated stator coupling
- Hollow through shaft (Ø 20 mm)
- System accuracy: $\pm 2.5''$ and $\pm 5''$



System accuracy	$\pm 2.5''$	$\pm 5''$
D1	Ø 20H6 E	Ø 20H7 E
D2	Ø 30H6 E	Ø 30H7 E
D3	Ø 20g6 E	Ø 20g7 E
T	0.01	0.02

mm

 Tolerancing ISO 8015
 ISO 2768:1989-mH
 ≤ 6 mm: ± 0.2 mm

Radial cable (can also be used axially)
 A = Bearing of mating shaft
 C = Required mating dimensions
 1 = Position of the reference mark signal $\pm 5^\circ$
 2 = Direction of shaft rotation for ascending position values
 3 = Accessory: ring nut (ID 336669-03)
 4 = Stated tolerance contains mounting tolerances and thermal expansion;
 no dynamic movement permitted

	Incremental RON 275	RON 275	RON 285	RON 287
Measuring standard	DIADUR circular scale with incremental track			
Line count	18 000			
System accuracy	±5"			±2.5"
Position error per signal period	≤ ±0.7"			
Interface	□ TTL		~ 1 V _{PP}	
Integrated interpolation* Output signals per rev.	5-fold 90 000	10-fold 180 000	-	
Reference mark*	One		RON 2xx: One RON 2xx C: Distance-coded	
Cutoff frequency -3 dB Output frequency Edge separation <i>a</i>	- ≤ 250 kHz ≥ 0.96 μs	- ≤ 1 MHz ≥ 0.22 μs	≥ 180 kHz - -	
Elec. permissible speed	≤ 166 rpm	≤ 333 rpm	-	
Electrical connection*	Cable (1 m), with or without 12-pin M23 coupling (male)			
Cable length ¹⁾	≤ 50 m		≤ 150 m	
Supply voltage	DC 5 V ±0.5 V/≤ 150 mA (without load)			
Shaft	Hollow through shaft D = 20 mm			
Mech. permissible speed	≤ 3000 rpm			
Starting torque	≤ 0.08 Nm at 20 °C			
Moment of inertia of rotor	73.0 · 10 ⁻⁶ kgm ²			
Permissible axial motion of measured shaft	±0.1 mm			
Natural frequency	≥ 1200 Hz			
Vibration 55 Hz to 2000 Hz Shock 6 ms	≤ 100 m/s ² (EN 60068-2-6) ≤ 200 m/s ² (EN 60068-2-27)			
Operating temperature	Frequent flexing: -10 °C to 70 °C Stationary cable: -20 °C to 70 °C			0 °C to 50 °C
Protection EN 60529	IP64			
Mass	≈ 0.8 kg			

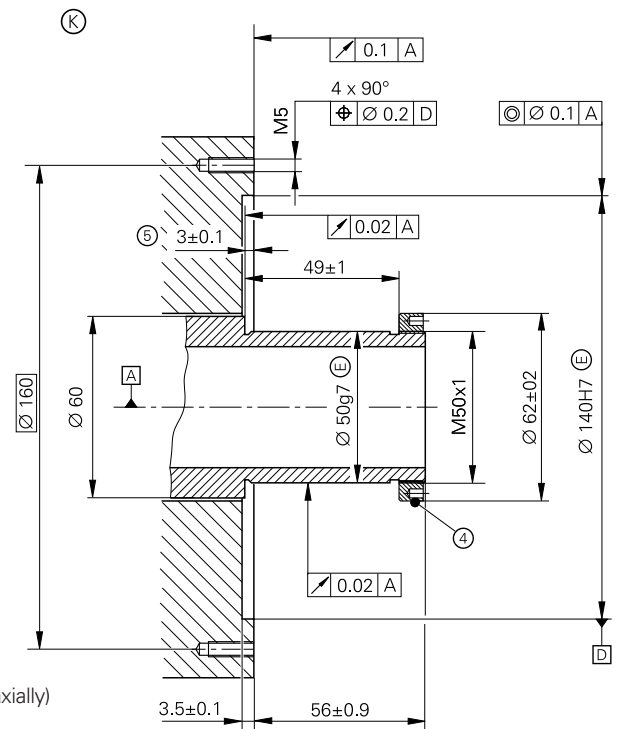
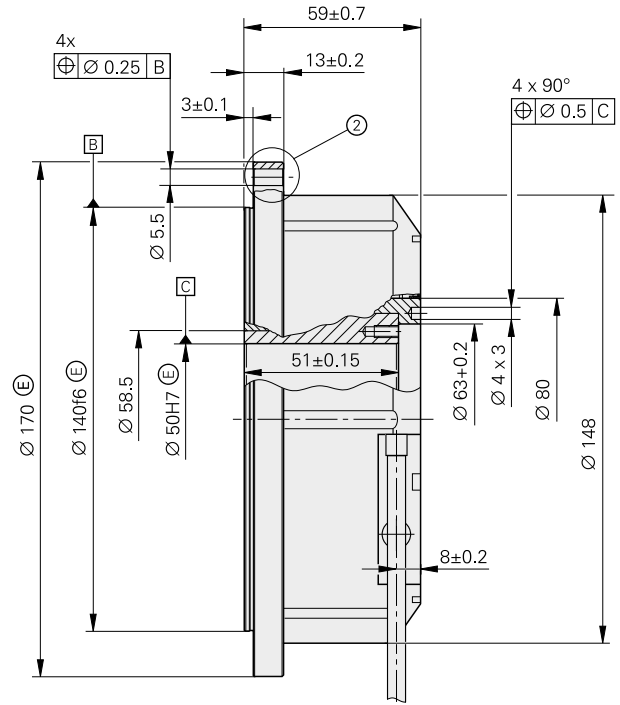
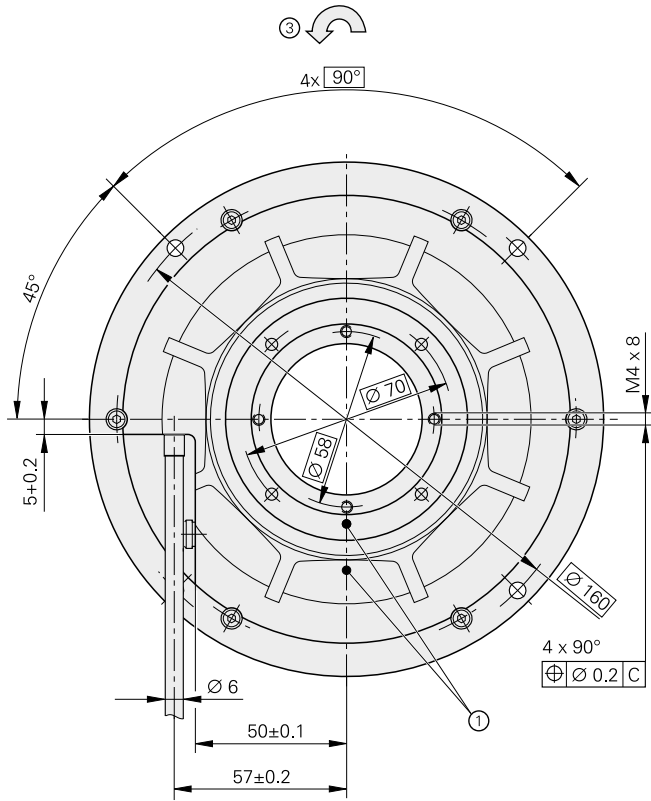
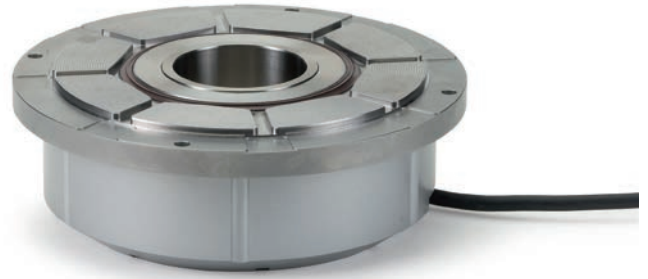
* Please select when ordering

¹⁾ With HEIDENHAIN cable

²⁾ Range includes mounting tolerances and thermal expansion; no dynamic movement permitted

RON 785

- Integrated stator coupling
- Hollow through shaft (Ø 50 mm)
- System accuracy: $\pm 2''$



Radial cable (can also be used axially)

▣ = Bearing of mating shaft

⊙ = Required mating dimensions

1 = Position of the reference mark signal $\pm 5''$

2 = Shown rotated by $45''$

3 = Direction of shaft rotation for ascending position values

4 = Accessory: ring nut (ID 336669-15)

5 = Specified tolerance includes mounting tolerances and thermal expansion; no dynamic motion permitted

mm



Tolerancing ISO 8015
ISO 2768:1989-mH
 ≤ 6 mm: ± 0.2 mm

	Incremental RON 785
Measuring standard	DIADUR circular scale with incremental track
Line count	18 000
System accuracy	±2"
Position error per signal period	≤ ±0.7"
Interface	~ 1 V _{PP}
Reference mark*	<i>RON 785</i> : One <i>RON 785C</i> : Distance-coded
Cutoff frequency -3 dB	≥ 180 kHz
Electrical connection*	Cable (1 m), with or without 12-pin M23 coupling (male)
Cable length ¹⁾	≤ 150 m
Supply voltage	DC 5 V ±0.5 V/≤ 150 mA (without load)
Shaft	Hollow through shaft D = 50 mm
Mech. permissible speed	≤ 1000 rpm
Starting torque	≤ 0.5 Nm at 20 °C
Moment of inertia of rotor	1.05 · 10 ⁻³ kgm ²
Permissible axial motion of measured shaft	±0.1 mm
Natural frequency	≥ 1000 Hz
Vibration 55 Hz to 2000 Hz Shock 6 ms	≤ 100 m/s ² (EN 60068-2-6) ≤ 200 m/s ² (EN 60068-2-27)
Operating temperature	0 °C to 50 °C
Protection EN 60529	IP64
Mass	≈ 2.5 kg

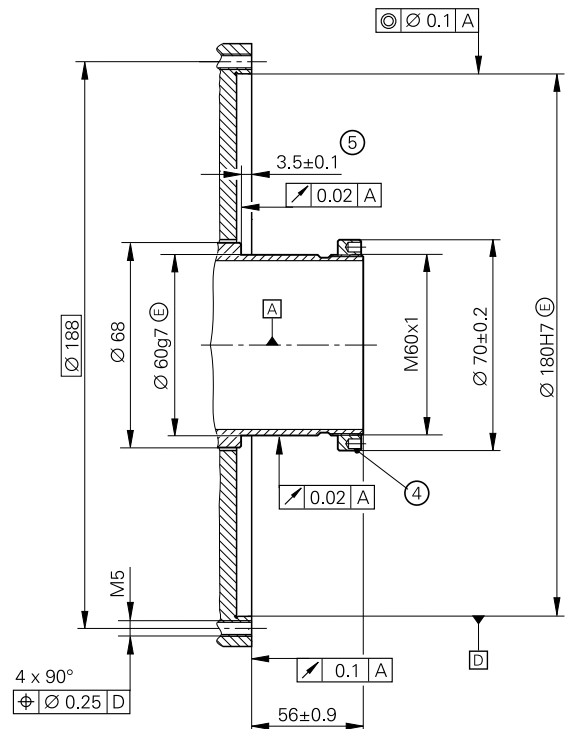
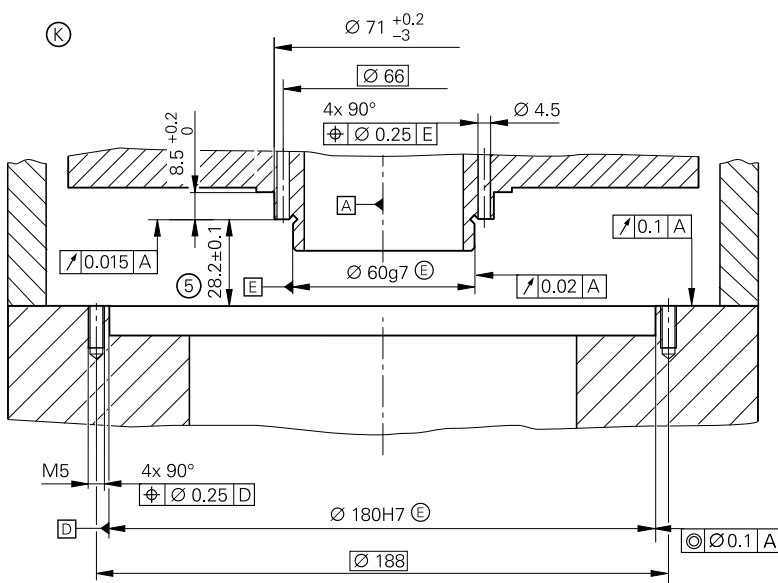
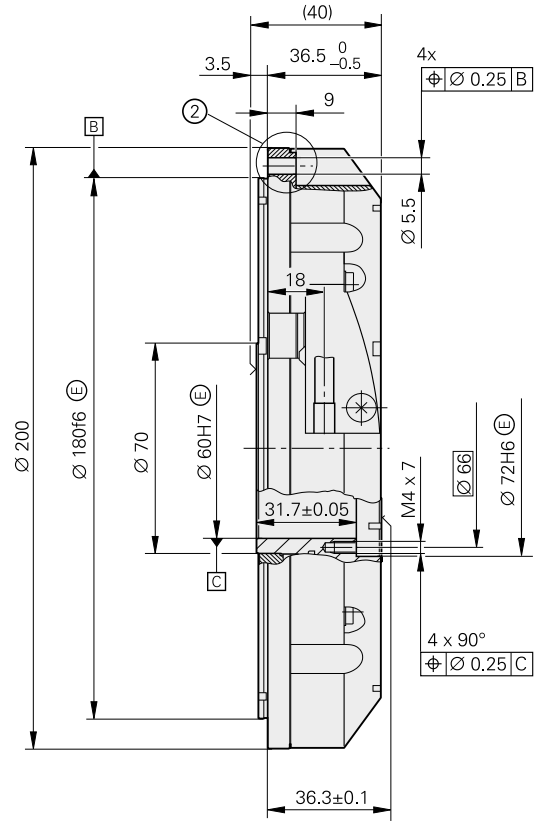
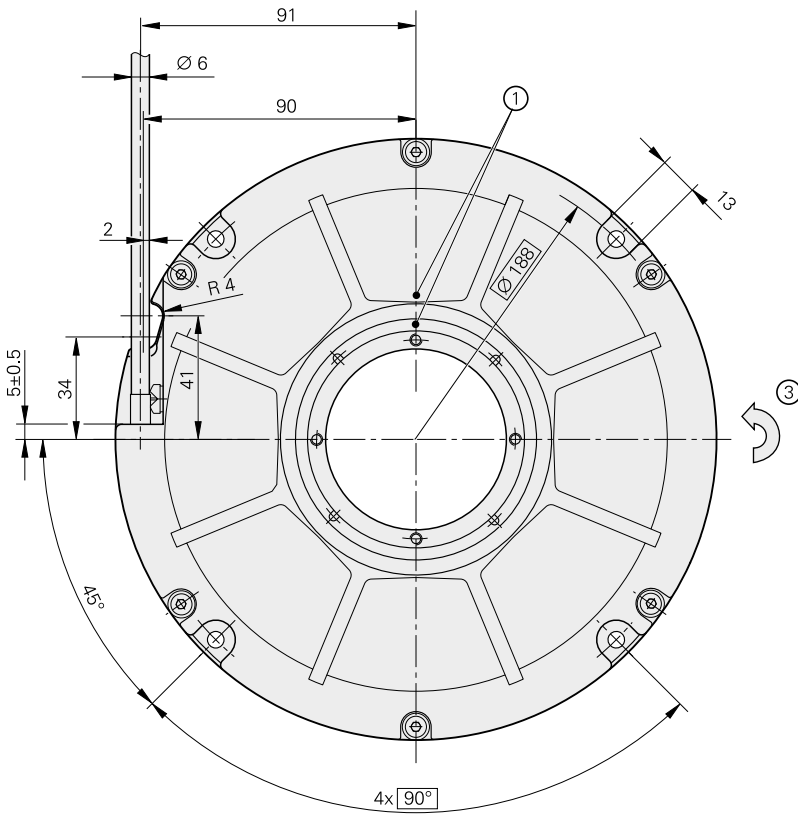
* Please select when ordering

¹⁾ With HEIDENHAIN cable

²⁾ Range includes mounting tolerances and thermal expansion; no dynamic movement permitted

RON 786/RON 886/RPN 886

- Integrated stator coupling
- Hollow through shaft ($\varnothing 60$ mm)
- System accuracy: $\pm 1''$ or $\pm 2''$



Radial cable (can also be used axially)

\triangle = Bearing of mating shaft

\odot = Required mating dimensions

1 = Position of the reference mark signal $\pm 5^\circ$

2 = Shown rotated by 45°

3 = Direction of shaft rotation for ascending position values

4 = Accessory: ring nut ID 336669-15

5 = Stated tolerance includes mounting tolerances and thermal expansion; no dynamic movement permitted

mm



Tolerancing ISO 8015

ISO 2768:1989-mH

≤ 6 mm: ± 0.2 mm

	Incremental RON 786	RON 886	RPN 886
Measuring standard	DIADUR circular scale with incremental track		
Line count*	18000 36000	36000	90000 (\triangleq 180000 signal periods)
System accuracy	$\pm 2''$	$\pm 1''$	
Position error per signal period	<i>18000 lines:</i> $\leq \pm 0.7''$ <i>36000 lines:</i> $\leq \pm 0.35''$	$\leq \pm 0.35''$	$\leq \pm 0.1''$
Interface	$\sim 1 V_{PP}$		
Reference mark*	<i>RON x86:</i> One <i>RON x86C:</i> Distance-coded		One
Cutoff frequency	-3 dB -6 dB	≥ 180 kHz	≥ 800 kHz ≥ 1300 kHz
Electrical connection*	Cable (1 m), with or without 12-pin M23 coupling (male)		
Cable length ¹⁾	≤ 150 m		
Supply voltage	DC 5 V ± 0.5 V/ ≤ 150 mA (without load)		DC 5 V ± 0.5 V/ ≤ 250 mA (without load)
Shaft	Hollow through shaft D = 60 mm		
Mech. permissible speed	≤ 1000 rpm		
Starting torque	≤ 0.5 Nm at 20 °C		
Moment of inertia of rotor	$1.20 \cdot 10^{-3}$ kgm ²		
Permissible axial motion of measured shaft	$\leq \pm 0.1$ mm		
Natural frequency	≥ 1000 Hz		≥ 500 Hz
Vibration 55 Hz to 2000 Hz Shock 6 ms	≤ 100 m/s ² (EN 60068-2-6) ≤ 200 m/s ² (EN 60068-2-27)		≤ 50 m/s ² (EN 60068-2-6) ≤ 200 m/s ² (EN 60068-2-27)
Operating temperature	0 °C to 50 °C		
Protection EN 60529	IP64		
Mass	≈ 2.5 kg		

* Please select when ordering

¹⁾ With HEIDENHAIN cable

²⁾ Range includes mounting tolerances and thermal expansion; no dynamic movement permitted

Mechanical design types and mounting

RON, RPN

The **RON** and **RPN** angle encoders have an integral bearing, a hollow shaft and a stator-side coupling. The measured shaft is directly connected to the shaft of the angle encoder.

Setup

The circular scale is rigidly affixed to the hollow shaft. The scanning unit rides on the shaft on ball bearings and is connected to the housing with a coupling on the stator side. The stator coupling and the sealing design compensate for axial and radial mounting error to a high degree without restricting accuracy or functionality. This thereby simplifies mounting. During angular acceleration of the shaft, the stator coupling must absorb only the torque resulting from friction within the bearing. Angle encoders with stator coupling therefore provide excellent dynamic performance.

Mounting

The housing of the RON and RPN is firmly connected to the mounting surface of the machine part by means of a mounting flange and a centering collar.

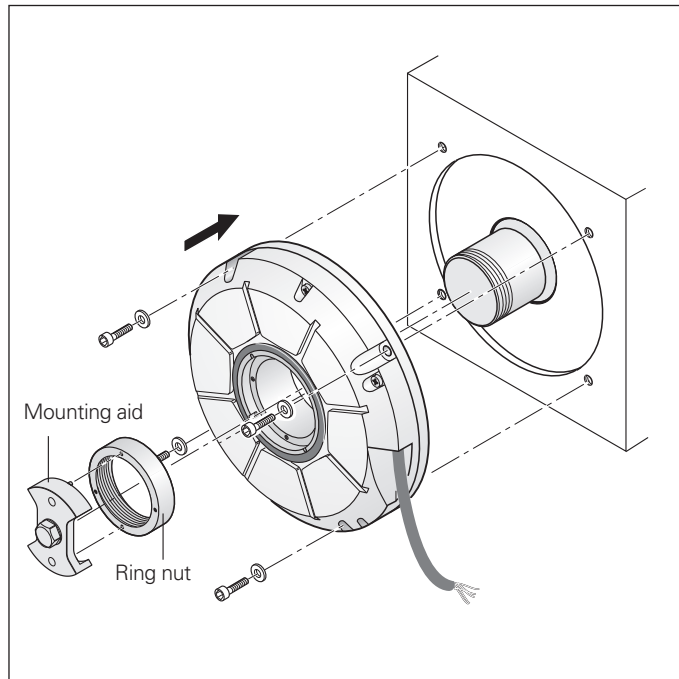
• RON and RPN shaft coupling

Shaft coupling with ring nut

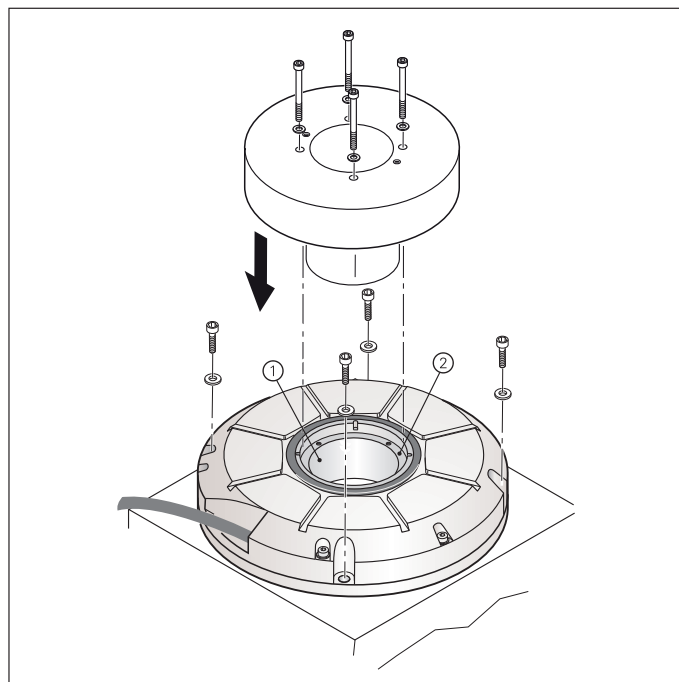
The shaft is designed as a hollow through shaft. For installation, the hollow through shaft of the angle encoder is seated onto the machine shaft and fastened from the encoder's front face with a ring nut. The ring nut can be easily tightened with the mounting aid.

Front-face shaft coupling

Especially for rotary tables, it is often helpful to integrate the angle encoder into the table such that the encoder is accessible when the rotor is lifted. The hollow shaft is connected through the front-face threaded holes by means of special mounting elements made for the given design (not included in delivery). In order to meet the radial and axial runout requirements, the interior hole ① and the shoulder surface ② must be used as the mounting surfaces for the front-face shaft coupling.



Mounting an angle encoder with a ring nut



Example of connecting an encoder to the shaft face

Ring nuts for the RON and RPN

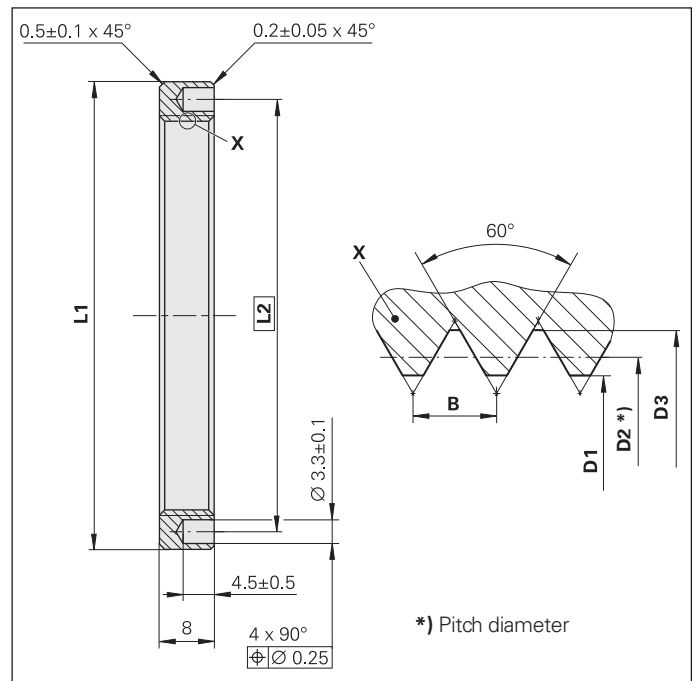
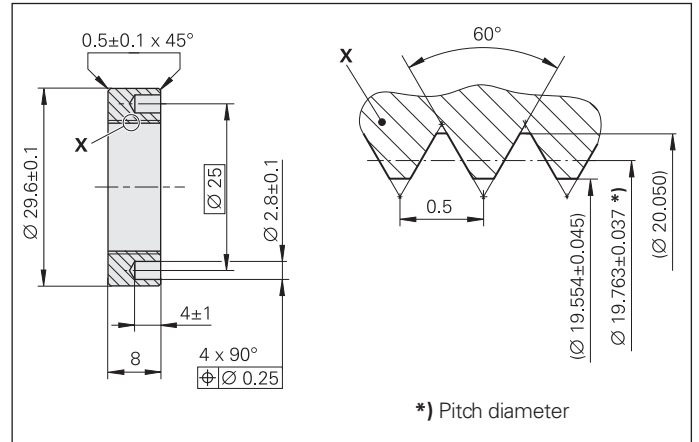
HEIDENHAIN offers special ring nuts for RON and RPN angle encoders. Choose the tolerance of the shaft thread such that the ring nut can be tightened easily, with a small amount of axial play. This guarantees that the load is evenly distributed on the shaft connection and prevents undesirable forces on the encoder's hollow shaft.



Ring nut for
Hollow shaft $\varnothing 20$ mm: ID 336669-03
Hollow shaft $\varnothing 50$ mm: ID 336669-15
Hollow shaft $\varnothing 60$ mm: ID 336669-11

Ring nut for	L1	L2	D1	D2	D3	B
Hollow shaft $\varnothing 50$	$\varnothing 62 \pm 0.2$	$\varnothing 55$	($\varnothing 49.052 \pm 0.075$)	$\varnothing 49.469 \pm 0.059$	($\varnothing 50.06$)	1
Hollow shaft $\varnothing 60$	$\varnothing 70 \pm 0.2$	$\varnothing 65$	($\varnothing 59.052 \pm 0.075$)	$\varnothing 59.469 \pm 0.059$	($\varnothing 60.06$)	1

Ring nut for hollow shaft $\varnothing 20$ mm



PWW inspection tool for RON/RPN angle encoders

The PWW makes it fast and easy to inspect the most significant mating dimensions. Its built-in measuring equipment measures position and radial runout, for example. It is best suited for the shaft coupling with a ring nut.

PWW for
Hollow shaft $\varnothing 20$ mm: ID 516211-01
Hollow shaft $\varnothing 50$ mm: ID 516211-02
Hollow shaft $\varnothing 60$ mm: ID 516211-03



Mounting tool for HEIDENHAIN ring nuts

The mounting aid is used to tighten the ring nut. Its pins lock into the holes in the ring nut. A torque wrench provides the necessary tightening torque.

Mounting aid for ring nuts with
Hollow shaft $\varnothing 20$ mm: ID 530334-03
Hollow shaft $\varnothing 50$ mm: ID 530334-15
Hollow shaft $\varnothing 60$ mm: ID 530334-11

Materials required for mounting the RON and RPN

The machine shaft and the fastening components must be made of steel. The material must exhibit a thermal coefficient of expansion $\alpha_{\text{therm}} = 10 \cdot 10^{-6} \text{ K}^{-1}$ to $\alpha_{\text{therm}} = 16 \cdot 10^{-6} \text{ K}^{-1}$.


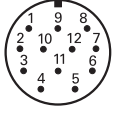

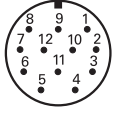
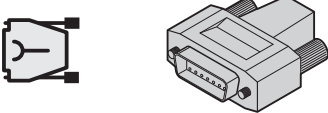
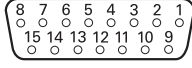
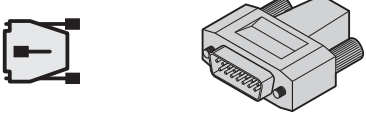
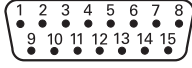




Additionally, the material must meet the following specifications:

- For hollow-shaft connection
 $R_m \geq 650 \text{ N/mm}^2$
 $R_{p0.2} \geq 370 \text{ N/mm}^2$
- For housing connection
 $R_{p0.2} \geq 370 \text{ N/mm}^2$

Electrical connection

~ 1 V_{PP} incremental signals

Pin layout

12-pin M23 coupling  					12-pin M23 connector  								
15-pin D-sub connector For HEIDENHAIN controls and IK 220  					15-pin D-sub connector For encoder or PWM 20  								
	Power supply				Incremental signals						Other signals		
	12	2	10	11	5	6	8	1	3	4	9	7	/
	1	9	2	11	3	4	6	7	10	12	5/8/13/15	14	/
	4	12	2	10	1	9	3	11	14	7	5/6/8/15	13	/
	U _P	Sensor ¹⁾ U _P	0V	Sensor ¹⁾ 0V	A+	A-	B+	B-	R+	R-	Vacant	Vacant	Vacant
	Brown/ Green	Blue	White/ Green	White	Brown	Green	Gray	Pink	Red	Black	/	Violet	Yellow

Cable shield connected to housing; **U_P** = Power supply voltage




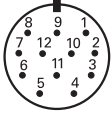
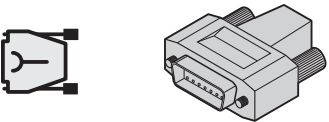
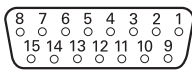
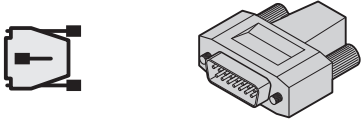
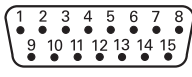




Sensor: The sense line is connected in the encoder with the corresponding power line.

Vacant pins or wires must not be used!

¹⁾ **LIDA 2xx:** vacant

TTL incremental signals

Pin layout

12-pin M23 coupling  					12-pin M23 connector  								
15-pin D-sub connector For HEIDENHAIN controls and IK 220  					15-pin D-sub connector For encoder or PWM 20  								
	Power supply				Incremental signals						Other signals		
	12	2	10	11	5	6	8	1	3	4	7	/	9 ³⁾
	1	9	2	11	3	4	6	7	10	12	14	8/13/15	5
	4	12	2	10	1	9	3	11	14	7	13	5/6/8	15 ³⁾
	U_P	Sensor ¹⁾ U_P	0V	Sensor ¹⁾ 0V	U_{a1}	\overline{U}_{a1}	U_{a2}	\overline{U}_{a2}	U_{a0}	\overline{U}_{a0}	\overline{U}_{aS} ²⁾	Vacant	Vacant
	Brown/ Green	Blue	White/ Green	White	Brown	Green	Gray	Pink	Red	Black	Violet	/	Yellow

Cable shield connected to housing; U_P = Power supply voltage

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

Vacant pins or wires must not be used!

¹⁾ **LIDA 2xx:** vacant / ²⁾ **ERO 14xx:** vacant

³⁾ **Exposed linear encoders:** conversion from TTL to 11 μA_{PP} for the PWT, otherwise not assigned

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.



More information:

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

- Brochure: *Angle Encoders with Integral Bearing* 591109-xx
- Brochure: *Interfaces of HEIDENHAIN Encoders* 1078628-xx
- Brochure: *Cables and Connectors* 1206103-xx

For brochures and Product Information documents, visit www.heidenhain.com.