

Bearingless encoders

Incremental, standard magnetic

RIM200 / RIM500 (hollow shaft)

Push-pull / RS422



High flexibility and performance with cost savings.

With a new technology approach based on digital signal processing independent of previous ASIC solutions, Kübler has expanded the range of applications for bearingless encoders. In conjunction with the available magnetic rings, the best possible accuracy is now always achieved. Influences due to individual installation and temperature differences during operation are automatically compensated in the sensor head. This facilitates integration into applications and makes the overall system even more powerful.



RS422 TTL Push-Pull HTL

Features and benefits

• High flexibility

- Freely selectable resolution up to 999 999 ppr independent of the magnetic ring diameter.
- Systems based on both, 2 mm and 5 mm, pole lengths are available. This allows you to choose between larger operating and assembly tolerances or a focus on the best possible performance.
- Many variants of magnetic ring and bore diameters.

• Highest precision

Active offset, phase and amplitude control automatically optimizes the sensor to the current operating situation. Influences due to individual installation and temperature differences during operation are automatically compensated in the sensor head.

• Fast and easy implementation

- For use in small installation spaces.
- Mounting tolerance between magnetic ring and sensor head are compensated by the electronics.
- Simple adjustment by fastening via slotted holes.
- Function display via LED.

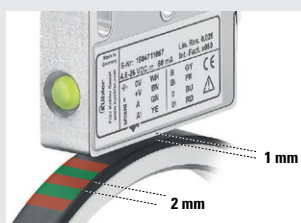
• Resistant and robust

- Non-contact and wear-free measuring system for a long service life.
- High shock and vibration resistance.
- Sturdy housing with degree of protection IP67, optional: Special housing for high resistance to condensation (IP68 / IP69, Resistance to cyclical humidity acc. to EN 60068-2-38 and humidity-heat acc. to EN 60068-2-78).

Selection of sensor head

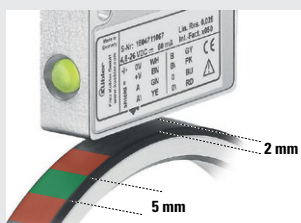
RIM200

The RIM200 system with 2 mm pole length should be used for high signal quality requirements. This requires good bearings and a stable installation process that allows an air gap of up to 1 mm.



RIM500

If the application requires a larger air gap (up to max. 2 mm), the RIM500 system with 5 mm pole length is used. High performance is also offered here with equally high signal quality.



Selection of magnetic ring

Outer diameter

Even if a high resolution can be realized for all outer diameters, it is recommended to select the largest possible diameter.



Bore hole

Various diameters and fastening types are available for mounting on the application shaft.



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Order code RIM200

Pole length 2 mm / distance between sensor head and magnetic ring max. 1 mm

8.RIM200	X	X	X	X	A	.	X	X	X	.	X	X	X	X	.	X	X	X	X	X	.	X	X	X	X
Type	a	b	c	d	e		f					g					h						i		

- a** *Mounting type*
 1 = Hub screw
 2 = Press fit

b *Model*
 1 = IP67, standard
 2 = IP68 / IP69 and humidity tested acc. to EN 60068-2-38, EN 60068-2-78

c *Zero pulse magnetic ring*¹⁾
 1 = without zero pulse
 2 = with zero pulse

d *Output circuit / Supply voltage*
 1 = RS422 / 4.8 ... 26.4 V DC
 2 = Push-pull (HTL/TTL universal) / 4.8 ... 26.4 V DC

e *Type of connection*
 A = radial cable, PUR (cable length see **f**)

f *Outer diameter magnetic ring*
 see table

g *Bore diameter magnetic ring*
 see table

h *Pulses per revolution*
 1 ... 999999 (e.g. 001024 for 1024 ppr)

i *Cable length (XXXX = length in dm)*
 0020 = 2 m [6.56'] (standard)
 0030 = 3 m [9.84']
 0050 = 5 m [16.40']
 0080 = 8 m [26.25'] (only with supply voltage > 6 V)
 0100 = 10 m [32.80'] (only with supply voltage > 6 V)
 0150 = 15 m [49.21'] (only with supply voltage > 6 V)
 0200 = 20 m [65.62'] (only with supply voltage > 6 V)

Magnetic ring with hub screw, pole length 2 mm (for mounting type **a = 1)**

Outer diameter [mm] ±0.10	Width [mm] ±0.30	Number of poles	Order code  zero pulse ¹⁾	Material hub	Order code  outer diameter	ø Bore [mm]	Order code  bore	max. speed min ⁻¹	Magnet material
31	16	50	1 (no)	Aluminum	031	8 H7	00800	12.000	Ferrite
						10 H7	01000		
						12 H7	01200		
						15 H7	01500		
						15.875 H7	01587		
						18 H7	01800		
						20 H7	02000		
41.2	16	64	1 (no)	Aluminum	041	8 H7	00800	12.000	Ferrite
						10 H7	01000		
						12 H7	01200		
						15 H7	01500		
						18 H7	01800		
						20 H7	02000		
						40.74	16		
20 H7	02000								
25 H7	02500								
45	16	72	1 (no)	Aluminum	045	8 H7	00800	12.000	Ferrite
						9.525 H7	00952		
						10 H7	01000		
						12 H7	01200		
						15 H7	01500		
						18 H7	01800		
						20 H7	02000		
						25 H7	02500		
						25.4 H7	02540		
						28.575 H7	02857		
30 H7	03000								

Magnetic ring press fit, pole length 2 mm (for mounting type **a** = 2)

48.90	10.40	80	2 (yes)	Steel	049	45.4 ±0.05	04540	15.000	Vulcanized rubber
87.13	9	140	1 (no)	Stainless steel	087	76 H7	07600	12.000	
202.3	9	320	1 (no)	Stainless steel	202	180 ±0.10	18000	2.000	

1) The sensor head always includes the function of evaluating a zero pulse.

Whether the RIMxxx system provides a zero pulse as an output signal depends on the choice of magnetic ring (with zero pulse **C** = 2 or without zero pulse **C** = 1). For magnetic rings with a zero pulse, this is detected once per revolution. For full-track magnetic rings without zero pulse, a signal is detected for every second pole.

Bearingless encoders

Incremental, standard magnetic	RIM200 / RIM500 (hollow shaft)	Push-pull / RS422
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Bestellschlüssel RIM500		8.RIM500	X	X	X	X	A	.	XXX	.	XXXXX	.	XXXXXX	.	XXXX
Pole lenght 5 mm / distance between sensor head and magnetic ring max. 2 mm		Type	a	b	c	d	e		f		g		h		i
a Mounting type 1 = Hub screw 2 = Press fit		f Outer diameter magnetic ring see table		g Bore diameter magnetic ring see table		h Pulses per revolution 1 ... 999999 (e.g. 001024 for 1024 ppr)		i Cable length (XXXX = length in dm) 0020 = 2 m [6.56'] (standard) 0030 = 3 m [9.84'] 0050 = 5 m [16.40'] 0080 = 8 m [26.25'] (only with supply voltage > 6 V) 0100 = 10 m [32.80'] (only with supply voltage > 6 V) 0150 = 15 m [49.21'] (only with supply voltage > 6 V) 0200 = 20 m [65.62'] (only with supply voltage > 6 V)		c Zero pulse magnetic ring ¹⁾ 1 = without zero pulse 2 = with zero pulse		d Output circuit / Supply voltage 1 = RS422 / 4.8 ... 26.4 V DC 2 = Push-pull (HTL/TTL universal) / 4.8 ... 26.4 V DC		e Type of connection A = radial cable, PUR (cable length see i)	
b Model 1 = IP67, standard 2 = IP68 / IP69 and humidity tested acc. to EN 60068-2-38, EN 60068-2-78															

Magnetic ring with hub screw, pole lenght 5 mm (for mounting type a = 1)									
Outer diameter [mm] ±0.10	width [mm] ±0.30	number of poles	Order code c zero pulse ¹⁾	material hub	order code f outer diameter	ø bore [mm]	order code g bore	max. speed min ⁻¹	magnet material
31	16	20	2 (yes)	Stainless steel	031	6 H7	00600	12.000	Ferrite
						8 H7	00800		
						10 H7	01000		
						12 H7	01200		
						15 H7	01500		
	20 H7	02000							
48.3	16	32	2 (yes)	Stainless steel	048	6 H7	00600	12.000	Ferrite
						8 H7	00800		
						10 H7	01000		
						12 H7	01200		
						15 H7	01500		
						20 H7	02000		
						25 H7	02500		
						25.4 H7	02540		
						28 H7	02800		
	30 H7	03000							
50.11	16	32	2 (yes)	Stainless steel	050	20 H7	02000	12.000	Vulcan. rubber
54.70	16	36	2 (yes)	Stainless steel	055	6 H7	00600	12.000	Ferrite
						8 H7	00800		
						10 H7	01000		
						12 H7	01200		
						15 H7	01500		
						20 H7	02000		
						25 H7	02500		
						30 H7	03000		
	35 H7	03500							
102	20	64	1 (no)	Stainless steel	102	70 H7	07000	4.000	Bonded rubber
			2 (yes)	Stainless steel	102	70 H7	07000		
Magnetic ring press fit, pole lenght 5 mm (for mounting type a = 2)									
48.90	10.40	32	2 (yes)	Steel	049	45.4 ±0.05	04540	15.000	Vulcan. rubber
202.3	9	128	1 (no)	Stainless steel	202	180 ±0.10	18000	2.000	Vulcanized rubber
			2 (yes)	Stainless steel	202	180 ±0.10	18000		

1) The sensor head always includes the function of evaluating a zero pulse.
Whether the RIMxxx system provides a zero pulse as an output signal depends on the choice of magnetic ring (with zero pulse **c** = 2 or without zero pulse **c** = 1).
For magnetic rings with a zero pulse, this is detected once per revolution. For full-track magnetic rings without zero pulse, a signal is detected for every second pole.

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Accessories / Displays		Order no.
Codix 560, preset counter 6-digit 	- Counter, tachometer, time counter and position display in one device - Scalable display - Readable via RS232/485 interface or configurable via MODBUS or CR/LF protocol	6.560.010.XXX
571T Touch, multifunction preset counters 8-digit 	- Measuring function for RPM, speed, speed from elapsed time, machine cycle time, throughput time (reciprocal rotary speed), as well as numerous count functions such as position display - Fast counting input (250 kHz/HTL, 1 MHz/RS422) - 4 switching outputs as limit values (response time < 1 ms) - Scalable analog output (response time < 150 ms), resolution 16 bit - Serial interface RS232 or RS485 for reading in and out the data	6.571T.01X.XXX

Further Kübler accessories can be found at: kuebler.com/accessories

Further Kübler cables and connectors can be found at: kuebler.com/connection-technology

Bearingless encoders

Incremental, standard magnetic	RIM200 / RIM500 (hollow shaft)	Push-pull / RS422
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Technical data

Mechanical characteristics		Electrical characteristics	
Maximum speed	12000 min ⁻¹	Output circuit	RS422 Push-pull
Protection	Model 1 IP67 acc. to EN 60529 Model 2 IP68 / IP69 acc. to EN 60529 and humidity tested acc. to EN 60068-2-38, EN 60068-2-78	Supply voltage	4.8 ... 26.4 VDC 4.8 ... 26.4 VDC
Operating temperature	-20 °C ... +80 °C [-4 °F ... +176 °F]	Power consumption (no load)	max. 80 mA max. 80 mA
Shock resistance	5000 m/s ² , 1 ms	Permissible load / channel	120 Ohm +/- 20 mA
Vibration resistance	300 m/s ² , 10 ... 2000 Hz	Output frequency max.	300 kHz 100 kHz 300 kHz (for supply voltage ≤ 8 V)
Pole length	2 mm or 5 mm	Signal level	HIGH min. 2.5 V min. +V - 2.0 V LOW max. 0.5 V max. 0.5 V
Housing (sensor head)	aluminum	Zero pulse	For magnetic rings with zero pulse, once per revolution. For full-track magnetic rings without zero pulse, every two poles.
Cable	2 m [6.56'] long, PUR, 8 x 0.14 mm ² [AWG 26], shielded, may be used in trailing cable installations		
Status LED	green ready for operation red Magnetic field error, e.g: - Distance between sensor head and magnetic ring too large - Pole length of magnetic ring and sensor head do not match		

Accuracy

System accuracy	typ. 0.3° with shaft tolerance g6
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Approvals

CE compliant in accordance with	
EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU

Terminal assignment

Output circuit	Type of connection	Cable (insulate unused cores individually before initial start-up)									
1, 2	A	Signal:	0 V	+V	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	$\pm$
		Aderfarbe:	WH	BN	GN	YE	GY	PK	BU	RD	shield ¹⁾

- +V: Supply voltage sensor +V DC
- 0 V: Supply voltage sensor ground GND (0 V)
- A, $\bar{A}$: Incremental output channel A / cosine signal
- B, $\bar{B}$: Incremental output channel B / sine signal
- 0, $\bar{0}$: Reference signal
- $\pm$: Sensor housing (shield)

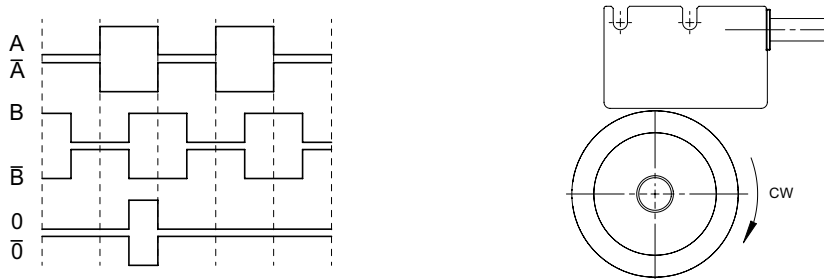
1) Shield is connected to sensor housing.

Bearingless encoders

Incremental, standard magnetic	RIM200 / RIM500 (hollow shaft)	Push-pull / RS422
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Signal figures

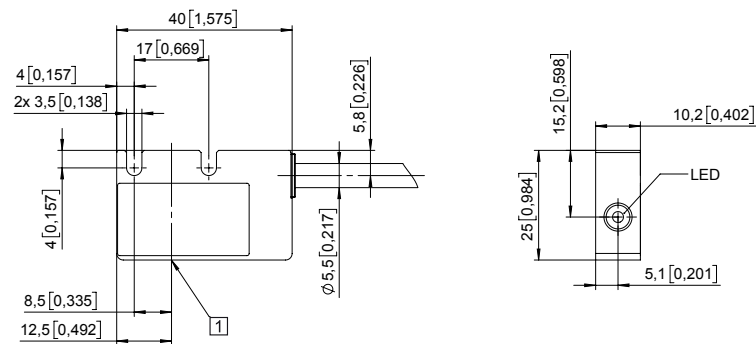
A leading B, when turning clockwise (cw)



Dimensions

Dimensions in mm [inch]

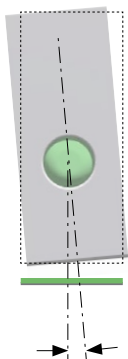
Sensor head



1 Active measuring area

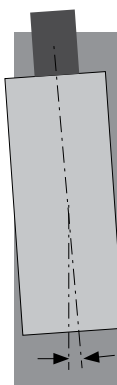
Permissible mounting tolerances

Tilting



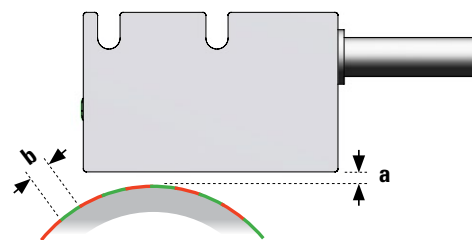
Tolerances for operation $\pm 3^\circ$

Torsion



Tolerances for operation $\pm 3^\circ$

Distance sensor head / magnetic ring



Distance sensor head / magnetic ring:

Pole length **b** = 2 mm / **a** = 0,1 ... 1,0 mm (0.4 mm [0.016] recommended)

Pole length **b** = 5 mm / **a** = 0,1 ... 2,0 mm (1.0 mm [0.039] recommended)

For lateral offset of sensor head to magnetic ring, see dimensional drawing of the corresponding magnetic ring

Bearingless encoders

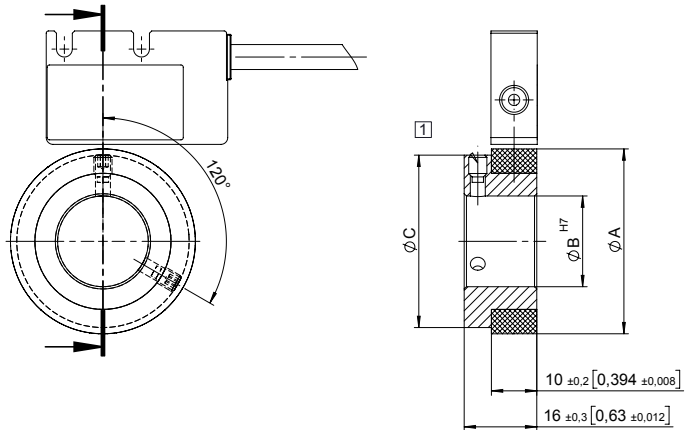
Incremental, standard magnetic	RIM200 / RIM500 (hollow shaft)	Push-pull / RS422
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Dimensions

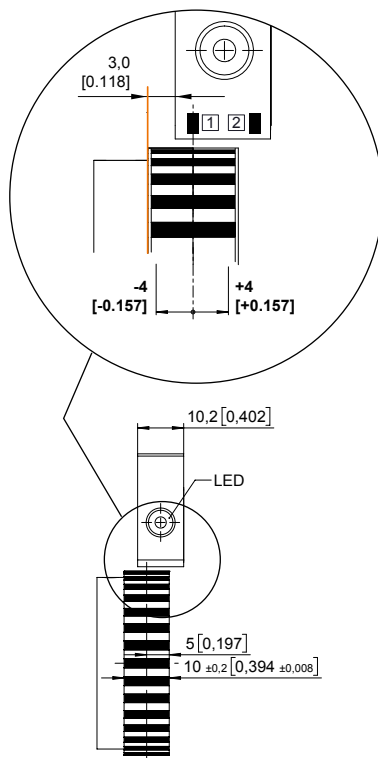
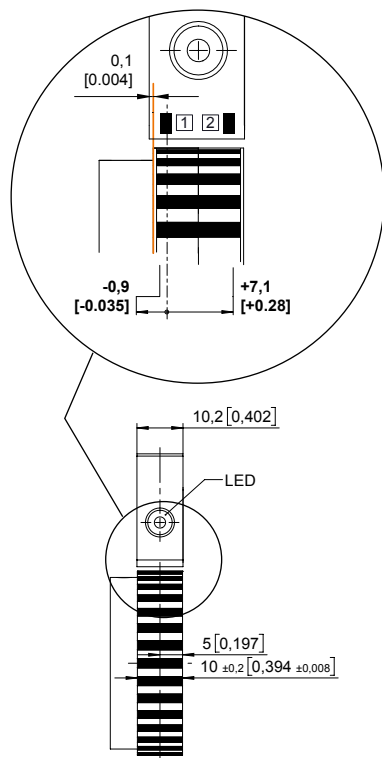
Dimensions in mm [inch]

Magnetic ring with hub screw,
outer diameter 31 mm [1.22] up to 54.7 mm [2.15]

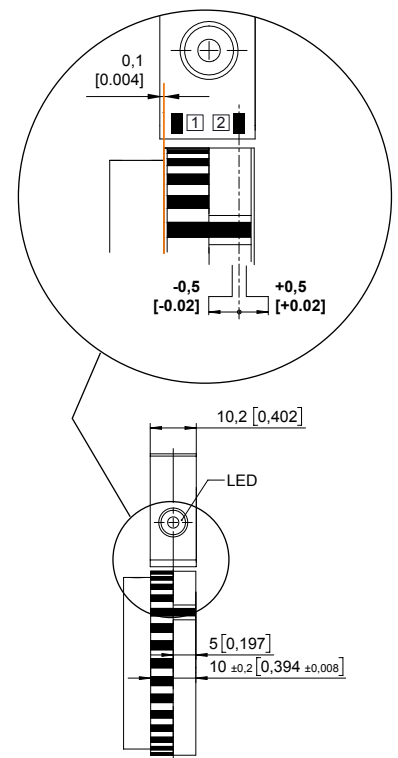
ø A [mm] ±0,10	ø B bore [mm]												C [mm] ø hub
	6	8	9,25	10	12	15	15,875	18	20	25	25,4	28,575	
31	•	•											28 / 29
40,74		•							•	•			28
41,2		•		•	•			•	•				28
45		•	•	•	•	•		•	•	•	•		38
48,3	•	•		•	•				•	•		•	46
50,11									•				40
54,7	•	•			•	•			•	•		•	53



Tolerances for lateral offset
when using a magnetic ring
without additional reference track



Tolerances for lateral offset
when using a magnetic ring
with additional reference track



- 1 Sensor element incremental track
- 2 Sensor element reference track

Bearingless encoders

Incremental, standard magnetic

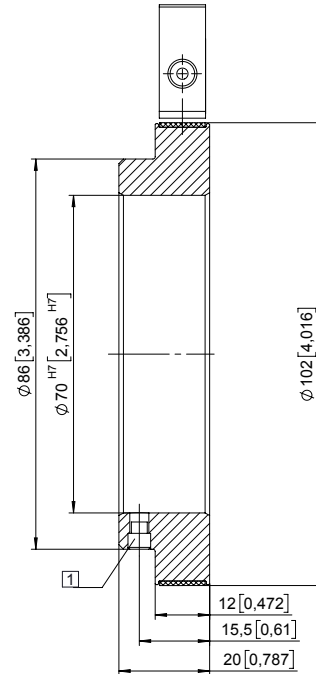
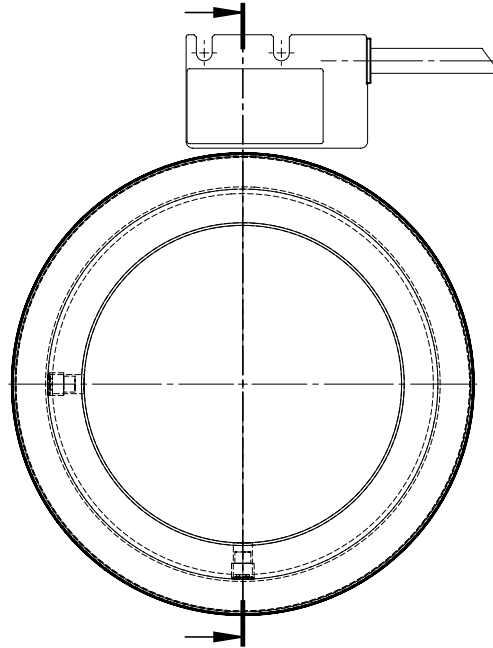
RIM200 / RIM500 (hollow shaft)

Push-pull / RS422

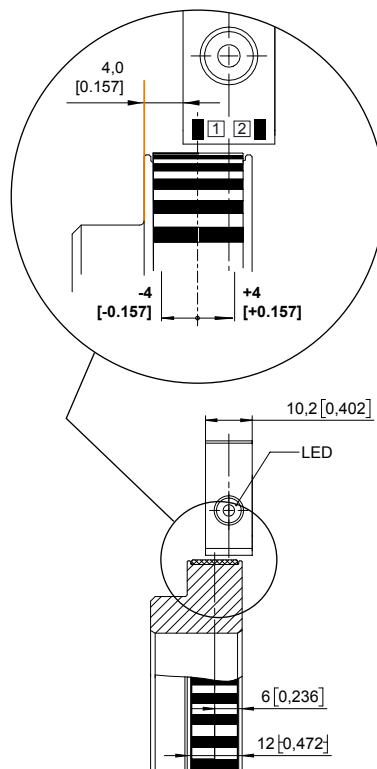
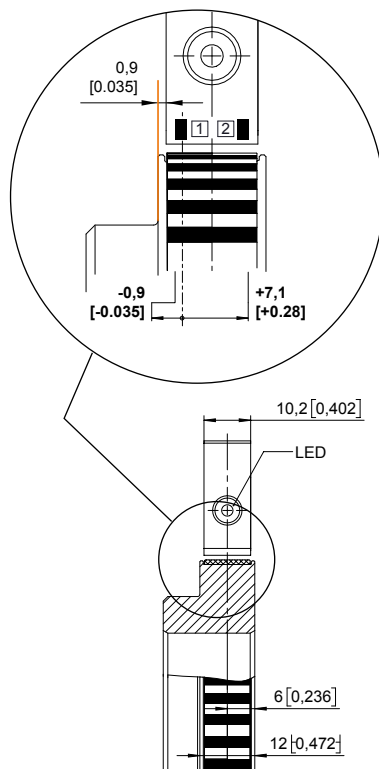
Dimensions

Dimensions in mm [inch]

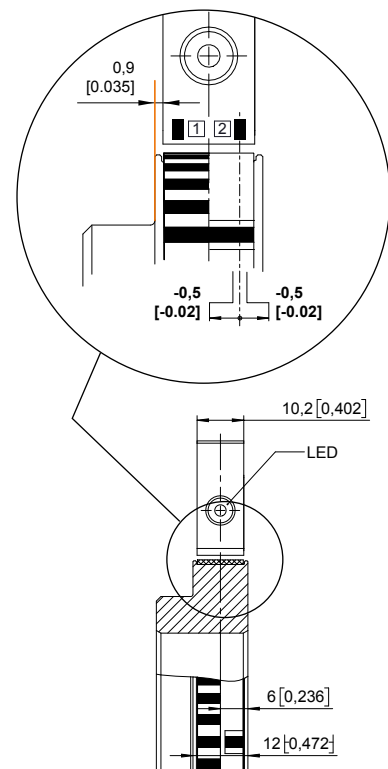
**Magnetic ring with hub screw,
outer diameter 102 mm [4.02]**



**Tolerances for lateral offset
when using a magnetic ring
without additional reference track**



**Tolerances for lateral offset
when using a magnetic ring
with additional reference track**



- 1 Sensor element incremental track
- 2 Sensor element reference track

Bearingless encoders

**Incremental, standard
magnetic**

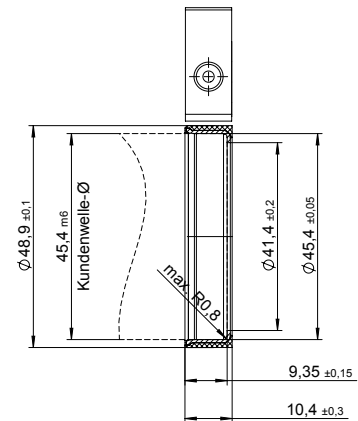
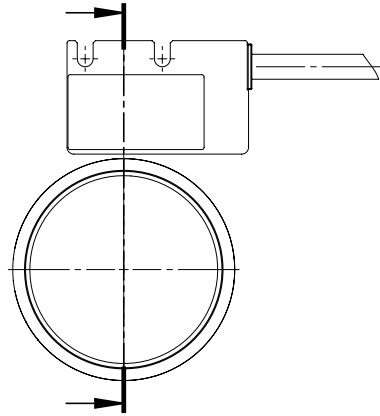
RIM200 / RIM500 (hollow shaft)

Push-pull / RS422

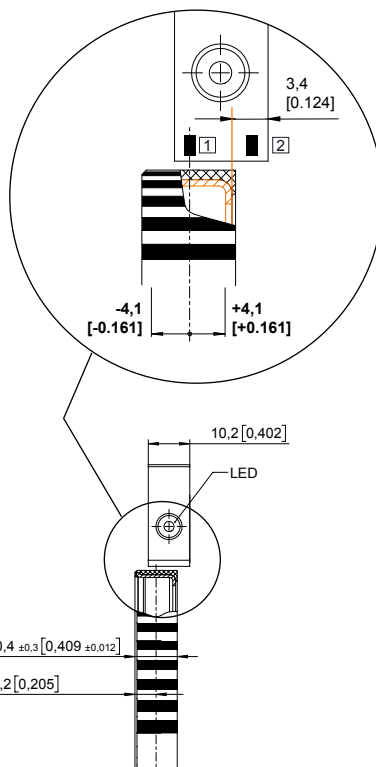
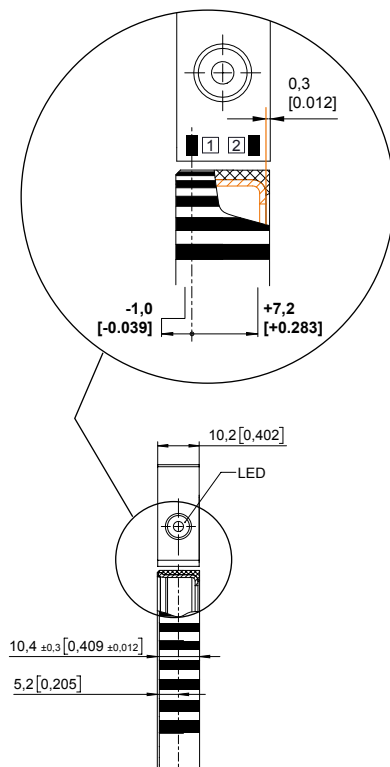
Dimensions

Dimensions in mm [inch]

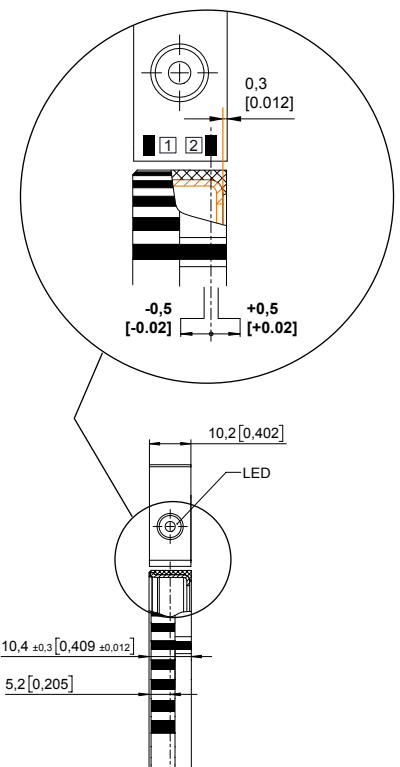
**Magnetring mit Presssitz,
outer diameter 48,9 mm [1.93]**



**Tolerances for lateral offset
when using a magnetic ring
without additional reference track**



**Tolerances for lateral offset
when using a magnetic ring
with additional reference track**



- 1 Sensor element incremental track
- 2 Sensor element reference track

Bearingless encoders

Incremental, standard magnetic

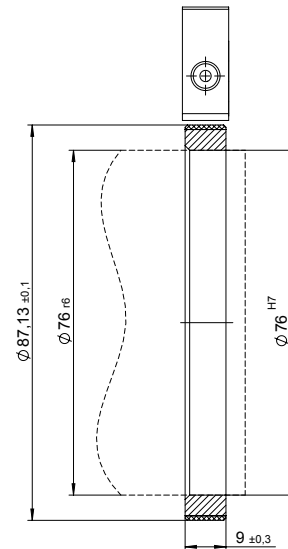
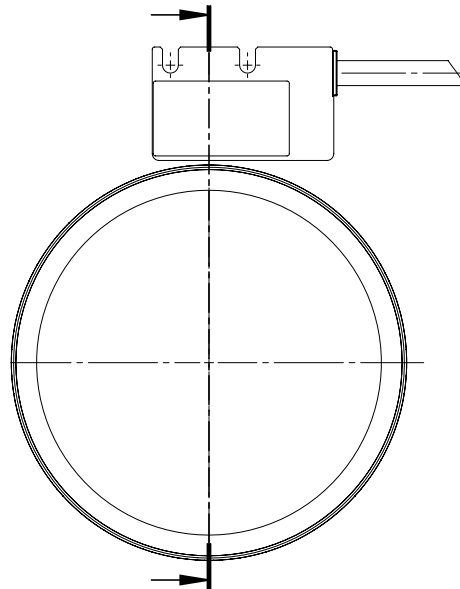
RIM200 / RIM500 (hollow shaft)

Push-pull / RS422

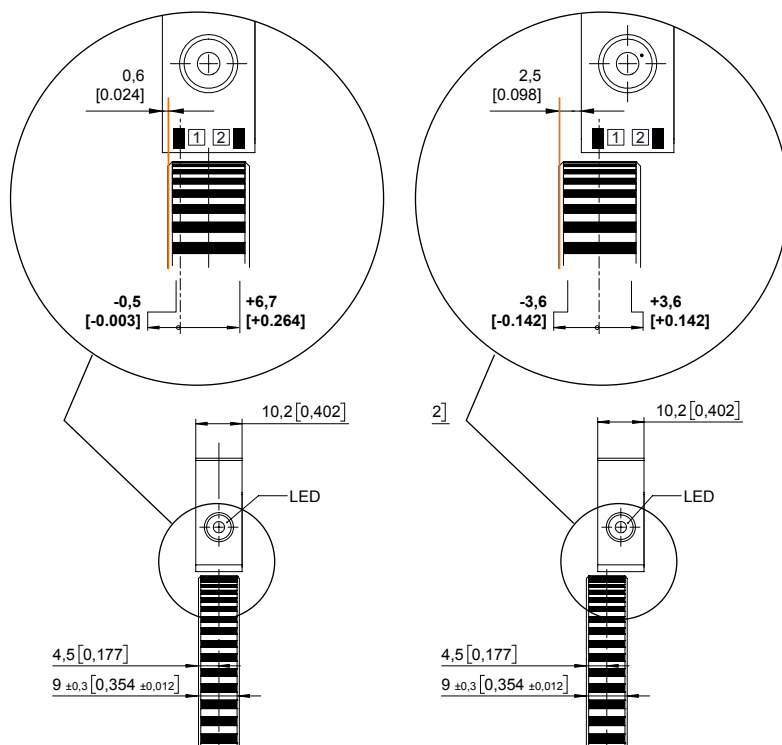
Dimensions

Dimensions in mm [inch]

**Magnetring mit Presssitz,
outer diameter 87,13 mm [3.43]**



**Tolerances for lateral offset
when using a magnetic ring
without additional reference track**



- 1 Sensor element incremental track
- 2 Sensor element reference track

Bearingless encoders

Incremental, standard magnetic

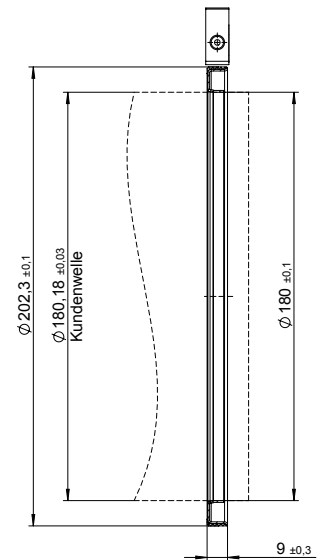
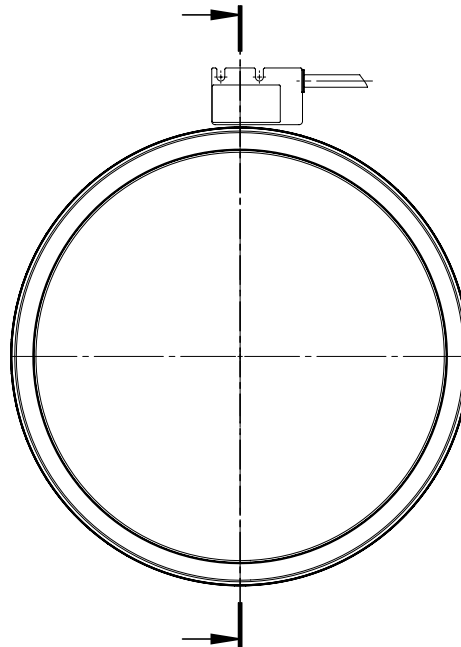
RIM200 / RIM500 (hollow shaft)

Push-pull / RS422

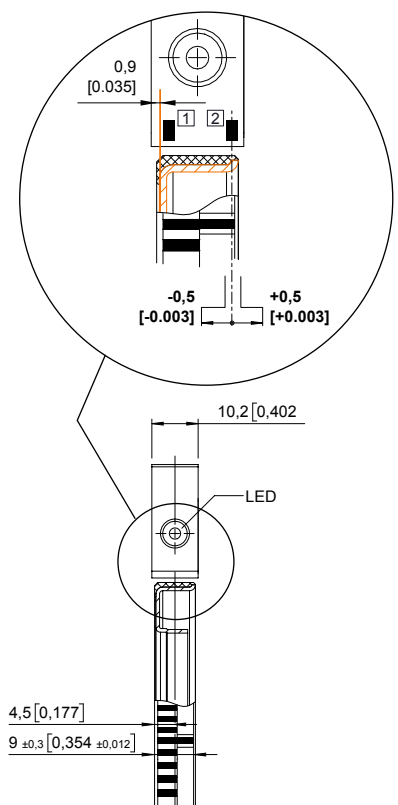
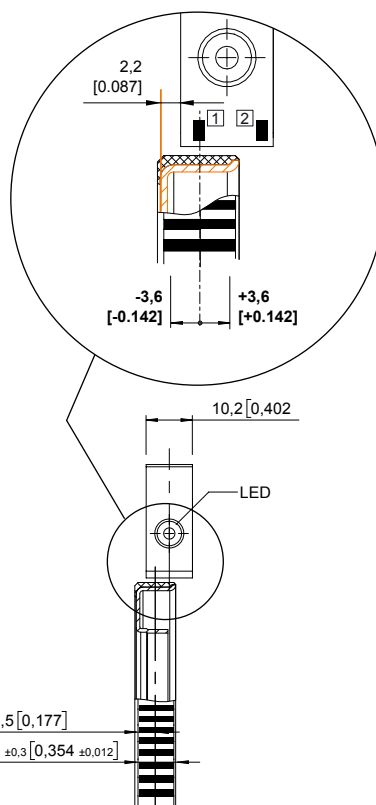
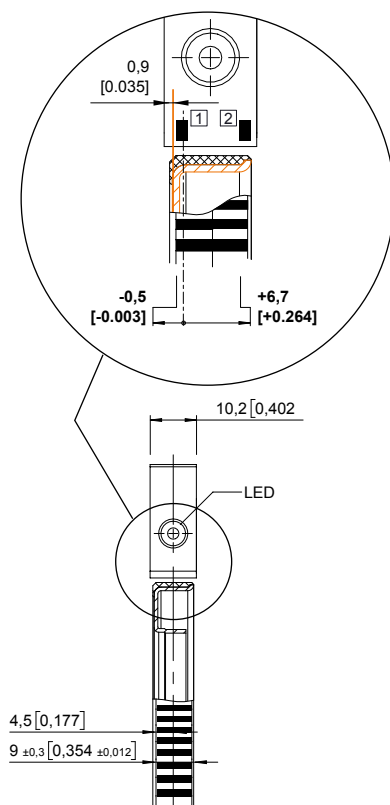
Dimensions

Dimensions in mm [inch]

**Magnetring mit Presssitz,
outer diameter 202,3 mm [7.96]**



**Tolerances for lateral offset
when using a magnetic ring
with additional reference track**



- 1 Sensor element incremental track
- 2 Sensor element reference track

Bearingless encoders

Incremental, standard magnetic

RIM200 / RIM500 (hollow shaft)

Push-pull / RS422

Technology in detail

Functional principle

The sensor module for the incremental track records 2 signal periods, which are offset by 1/4 of the pole length, as input signals A and B.
→ 90° phase shift

