Incremental, standard magnetic | **RIM200 / RIM500 (hollow shaft)** | **Push-pull / RS422 / SinCos**



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.

RoHS RS422 TTL Push-Pull HTL SinCos

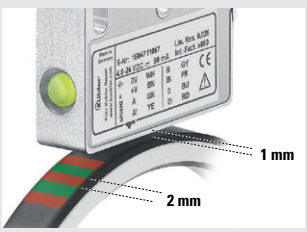
Features and benefits

- **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 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

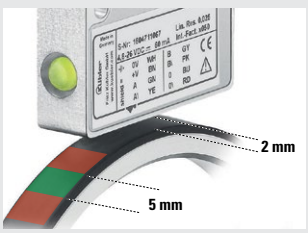
RIM200

The RIM200 system with 2 mm pole lenght 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 lenght 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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Incremental, standard magnetic | **RIM200 / RIM500 (hollow shaft)** | **Push-pull / RS422 / SinCos**

Order code RIM200

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

8.RIM200	.	X	X	X	X	X	.	XXX	.	XXXXX	.	XXXXXX	.	XXXX
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 / 6 ... 30 V DC
2 = RS422 / Gegentakt universell / 4.8 ... 30 V DC
RS422 (TTL) = 5 V DC, Gegentakt (HTL) = 10 ... 30 V DC
3 = SinCos / 4.5 ... 30 V DC

e *Type of connection*
A = radial cable, PUR (cable length see **i**)
C = radial cable, PUR, M12 connector (only with a cable length of 0.3 m)

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)*
0003 = 0.3 m (only in combination with connection type **e** = C)
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)
Other cable lengths available upon request

Magnetic ring with hub screw, pole lenght 2 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	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	64	**2** (yes)	Stainless steel	**041**	8 H7	**00800**	12.000	Ferrite
						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 lenght 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 a zero pulse, the use of the zero pulse output is not recommended (see the user manual).

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Incremental, standard magnetic | **RIM200 / RIM500 (hollow shaft)** | **Push-pull / RS422 / SinCos**

Order code RIM500

Pole lenght 5 mm / distance between sensor head and magnetic ring max. 2 mm

8.RIM500	.	X	X	X	X	X	.	XXX	.	XXXXX	.	XXXXXX	.	XXXX
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 / 6 ... 30 V DC
2 = RS422 / Gegentakt universell / 4.8 ... 30 V DC
RS422 (TTL) = 5 V DC, Gegentakt (HTL) = 10 ... 30 V DC
3 = SinCos / 4.5 ... 30 V DC

e *Type of connection*
A = radial cable, PUR (cable length see **i**)
C = radial cable, PUR, M12 connector (only with a cable length of 0.3 m)

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)*
0003 = 0.3 m (only in combination with connection type **e** = C)
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)
Other cable lengths available upon request

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 a zero pulse, the use of the zero pulse output is not recommended (see the user manual).

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

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** Details s. datasheet
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** Details s. datasheet

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

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Incremental, standard magnetic | **RIM200 / RIM500 (hollow shaft)** | **Push-pull / RS422 / SinCos**

Technical data

Mechanical characteristics

Maximum speed		12000 min^{-1}
Protection	Model 1 Model 2	IP67 acc. to EN 60529 IP68 / IP69 acc. to EN 60529 and humidity tested acc. to EN 60068-2-38, EN 60068-2-78
Operating temperature		-20 °C ... +80 °C [-4 °F ... +176 °F]
Shock resistance		5000 m/s^2, 1 ms
Vibration resistance		300 m/s^2, 10 ... 2000 Hz
Pole lenght		2 mm or 5 mm from pole to pole
Housing (sensor head)		zinc die-cast
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 red	ready for operation Magnetic field error, e.g: - Distance between sensor head and magnetic ring too large - Pole lenght of magnetic ring and sensor head do not match

Accuracy

System accuracy	typ. 0.3° with shaft tolerance g6

Approvals

CE compliant in accordance with

EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU

Electrical characteristics

Output circuit	**RS422 (TTL)**	**RS422 (TTL) / Push-pull (HTL)**	**SinCos**
Supply voltage	6 ... 30 V DC	4.8 ... 30 V DC RS422 (TTL) = 5 V DC Push-pull (HTL) = 10 ... 30 V DC	4.5 ... 30 VDC (cable length up to 20 m) 4.8 ... 30 VDC (cable length from 20 m to 29 m)
Power consumption (no load)	max. 80 mA	max. 80 mA	max. 100 mA
Permissible load / channel	120 Ohm	+/- 20 mA	100 Ohm
Output frequency max.	300 kHz	100 kHz 300 kHz (for supply voltage ≤ 8 V)	100 kHz
Signal level	HIGH min. 2.5 V LOW max. 0.5 V	HIGH min. +V - 2.0 V LOW max. 0.5 V	channels A/B 1 Vss (±20%)
Zero pulse	For magnetic rings with zero pulse, once per revolution. For full-track magnetic rings without a zero pulse, the use of the zero pulse output is not recommended. (See the user manual.)		

Terminal assignment

Output circuit	Type of connection	Cable (insulate unused cores individually before initial start-up)									
1, 2, 3	A	Signal:	0 V	+V	A	$\overline{A}$	B	$\overline{B}$	0	$\overline{0}$	⏚
		Core color:	WH	BN	GN	YE	GY	PK	BU	RD	shield [1]

Output circuit	Type of connection	Cable with M12 connector, 8-pin									
1, 2, 3	C	Signal:	0 V	+V	A	$\overline{A}$	B	$\overline{B}$	0	$\overline{0}$	⏚
		Pin:	1	2	3	4	5	6	7	8	Schirm [1]

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

Top view of mating side, male contact base



M12-connector, 8-pin

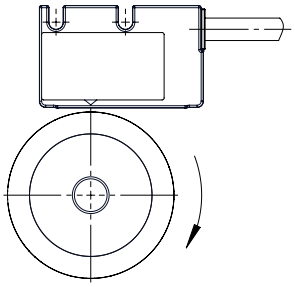
1) Shield is connected to sensor housing.

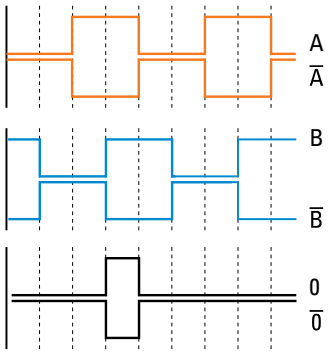
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Incremental, standard magnetic	RIM200 / RIM500 (hollow shaft)	Push-pull / RS422 / SinCos

Signal figures Push-pull / RS422

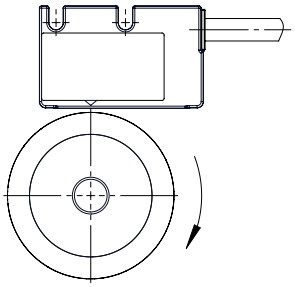
A leading B, when turning clockwise (cw)

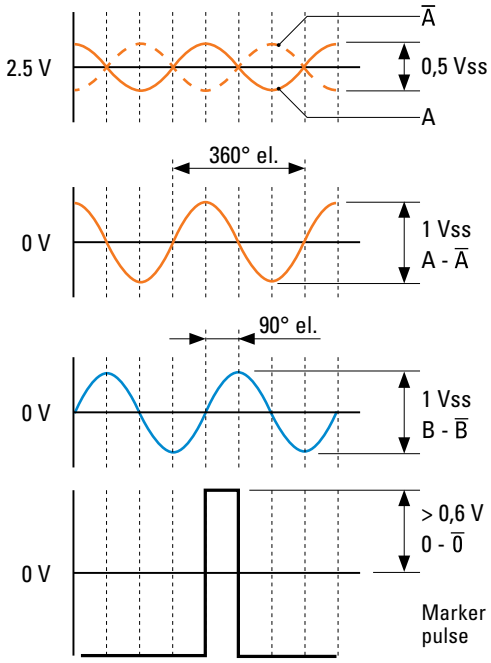




Signal figures SinCos

A leading B, when turning clockwise (cw)



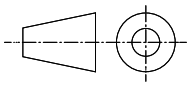


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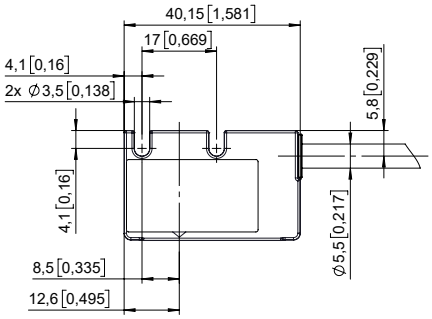
Incremental, standard magnetic	RIM200 / RIM500 (hollow shaft)	Push-pull / RS422 / SinCos

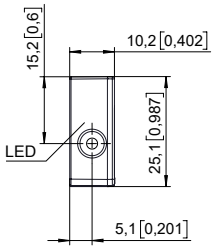
Dimensions

Dimensions in mm [inch
Projection method 1

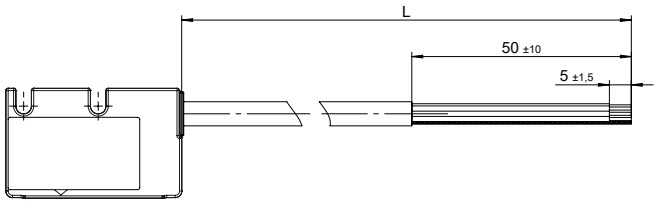


Sensor head

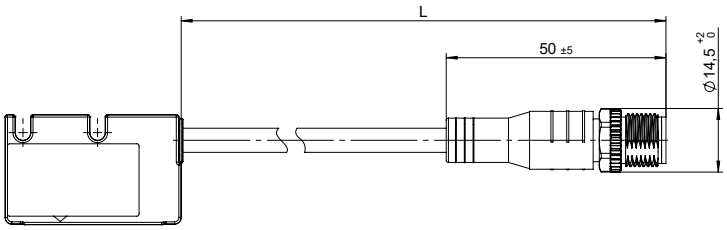




With cable, open ended



With cable and M12 connector



L = Cable length (see order code)

Length tolerances:

< 2 m = ±5%

2 ... 10 m = ±2.5%

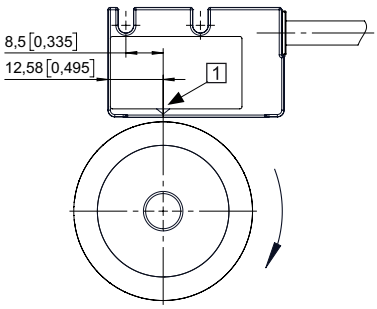
> 10 m = ±1%

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Incremental, standard magnetic | **RIM200 / RIM500 (hollow shaft)** | **Push-pull / RS422 / SinCos**

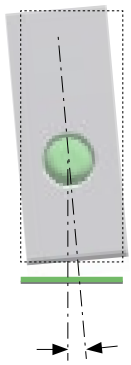
Mounting position

[1] Marking for aligning the sensor head with the magnetic ring



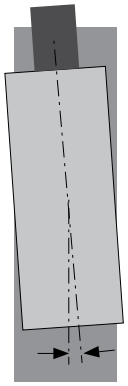
Permissible mounting tolerances

Tilting



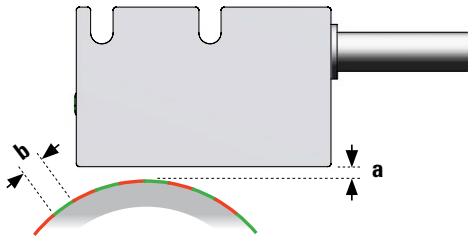
Tolerances for operation ±3°

Torsion



Tolerances for operation ±3°

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)

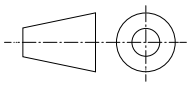
For lateral offset of sensor head to magnetic ring, see dimensional drawing of the corresponding magnetic ring

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

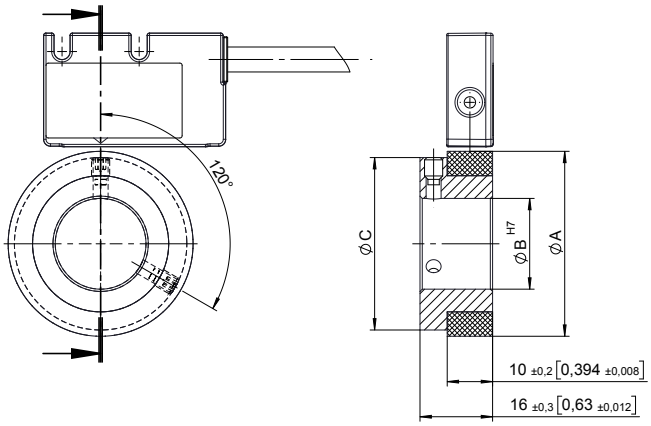
Dimensions

Dimensions in mm [inch
Projection method 1

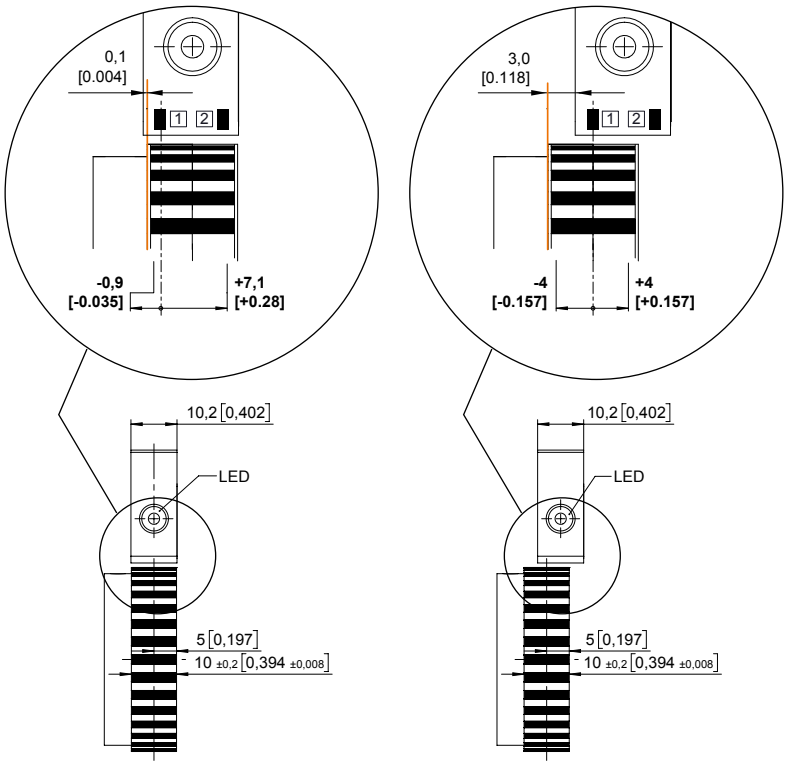


**Magnetic ring with hub screw,
outer diameter 31 mm [1.22] up to 54.7 mm [2.15]**

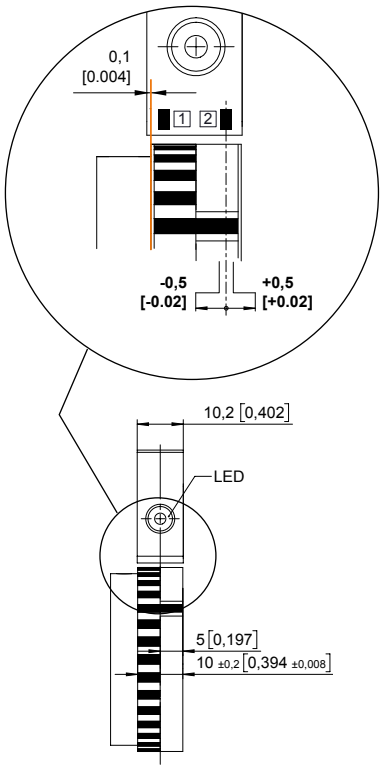
ø A [mm] ±0.10	ø B bore [mm]														C [mm] ø hub
	6	8	9.25	10	12	15	15.875	18	20	25	25.4	28.575	28	30	35	
31	•	•		•	•	•	•	•	•							28 / 29
40.74		•							•	•						28
41.2		•		•	•			•	•							28
45		•	•	•	•	•		•	•	•	•	•		•		38
48.3	•	•		•	•	•			•	•	•		•	•		46
50.11									•							40
54.7	•	•			•	•			•	•				•	•	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**



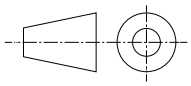
1 Sensor element incremental track
2 Sensor element reference track

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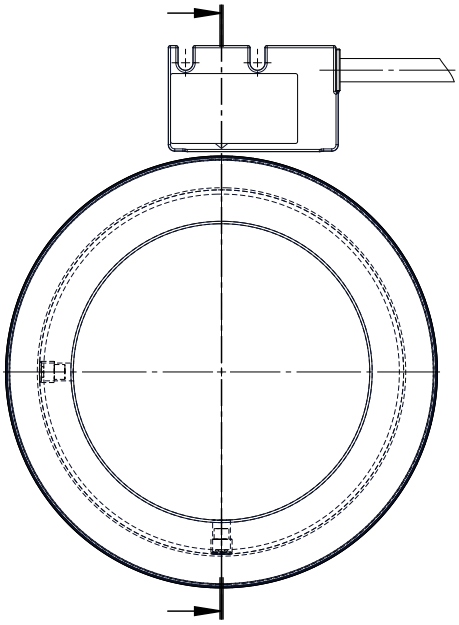
Incremental, standard magnetic | **RIM200 / RIM500 (hollow shaft)** | **Push-pull / RS422 / SinCos**

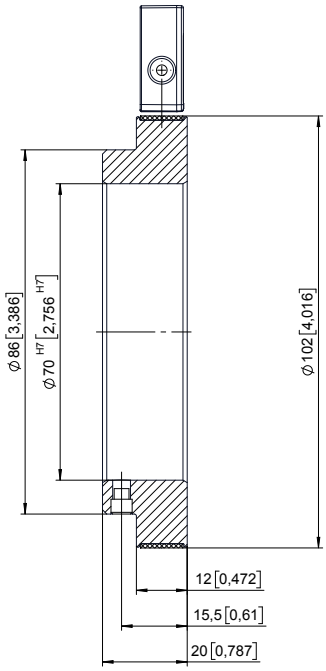
Dimensions

Dimensions in mm [inch
Projection method 1

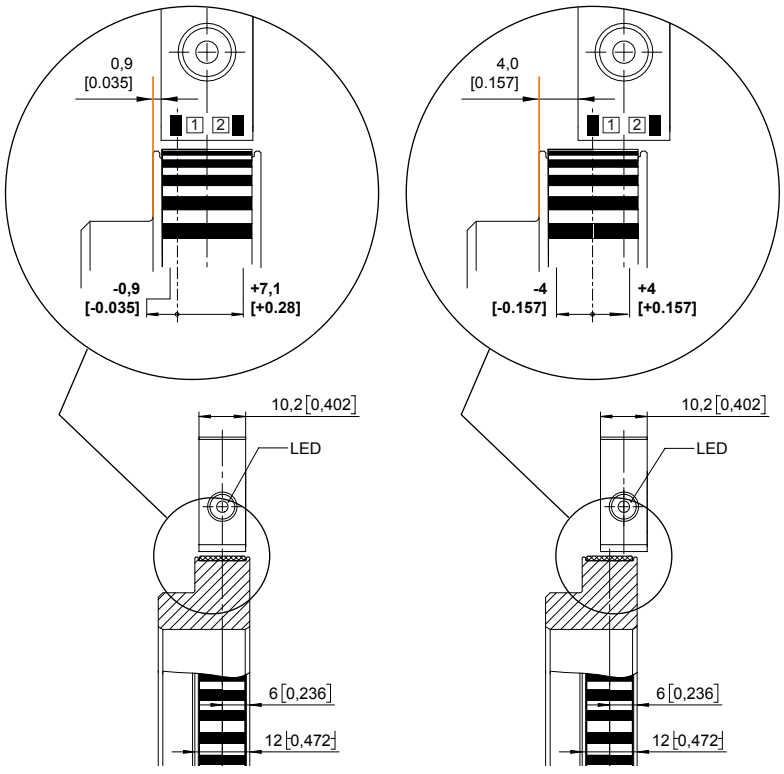


Magnetic ring with hub screw, outer diameter 102 mm [4.02]

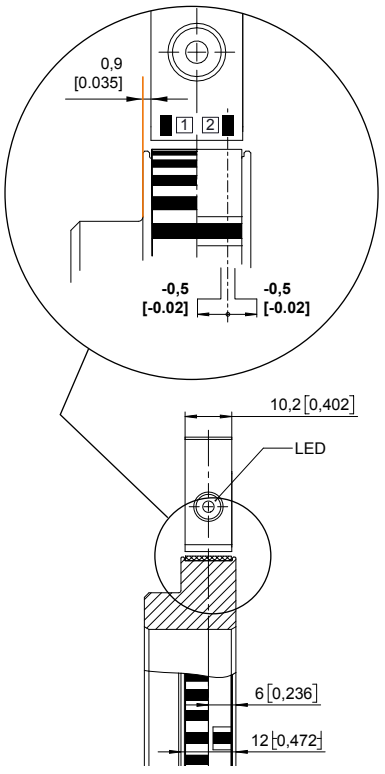




Tolerances for lateral offset when using a magnetic ring without additional reference track



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



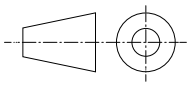
1 Sensor element incremental track
2 Sensor element reference track

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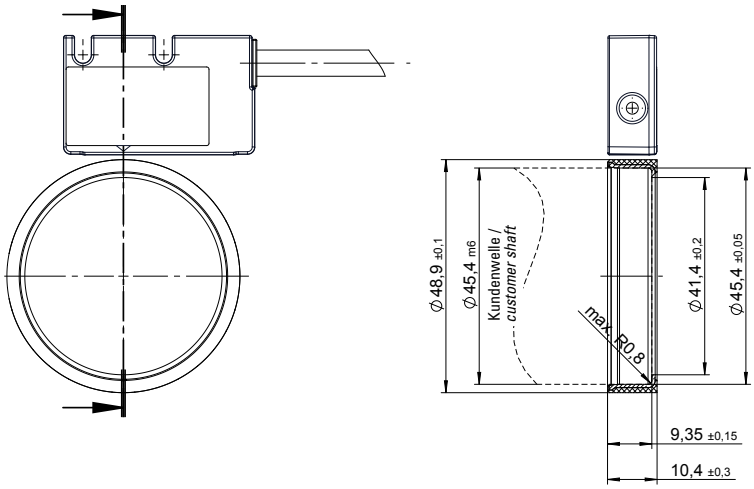
Incremental, standard magnetic	RIM200 / RIM500 (hollow shaft)	Push-pull / RS422 / SinCos

Dimensions

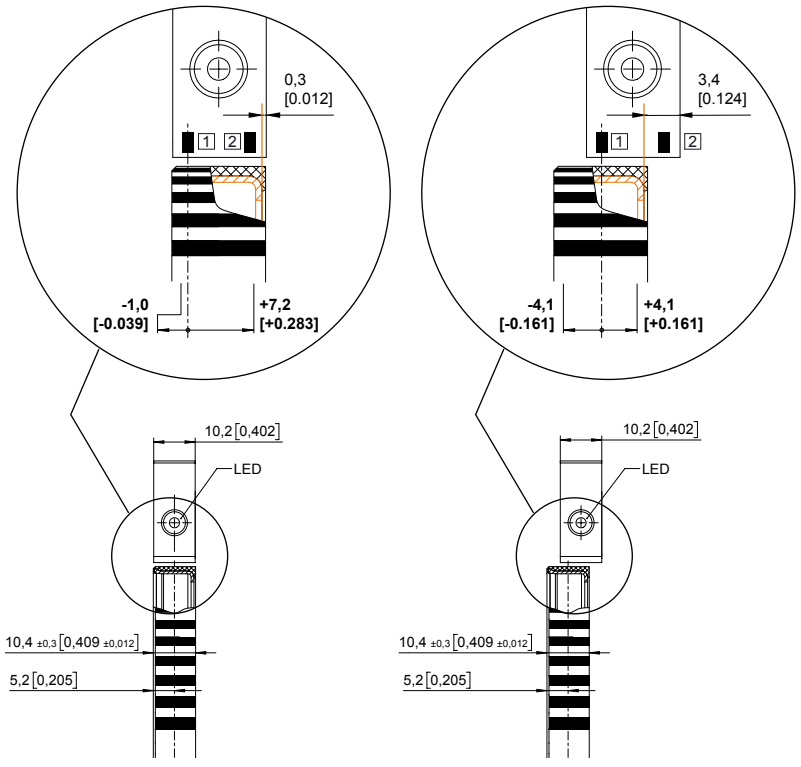
Dimensions in mm [inch
Projection method 1



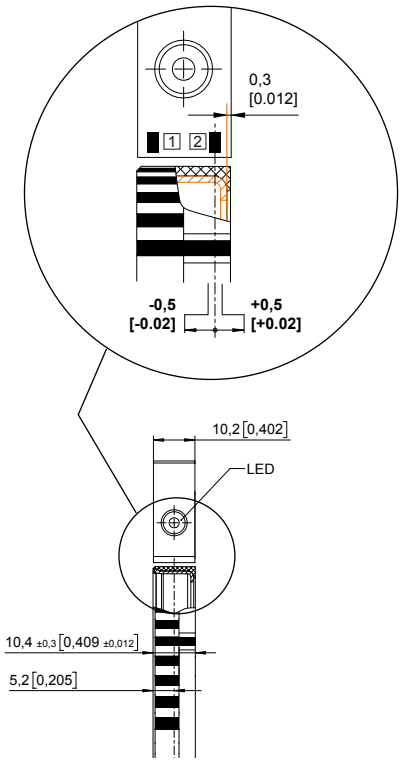
Magnetic ring with press fit, outer diameter 48.9 mm [1.93]



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



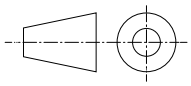
1 Sensor element incremental track
2 Sensor element reference track

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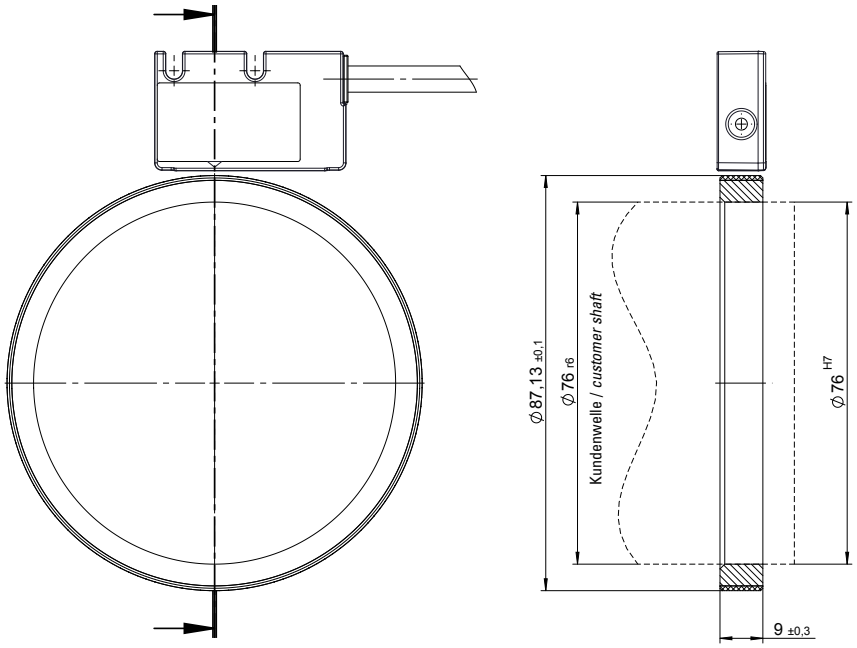
Incremental, standard magnetic | **RIM200 / RIM500 (hollow shaft)** | **Push-pull / RS422 / SinCos**

Dimensions

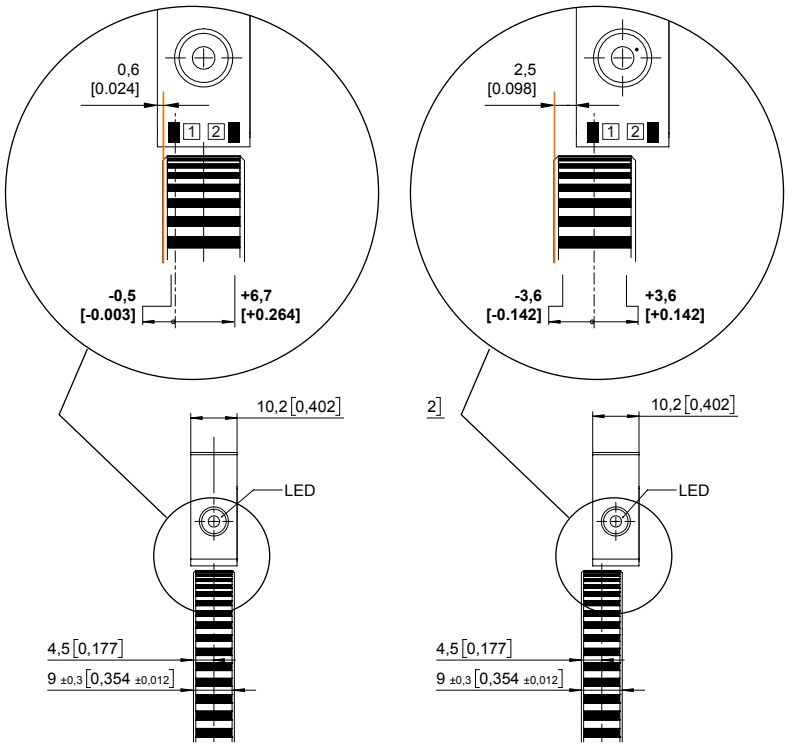
Dimensions in mm [inch
Projection method 1



Magnetic ring with press fit, outer diameter 87.13 mm [3.43]



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



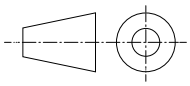
1 Sensor element incremental track
2 Sensor element reference track

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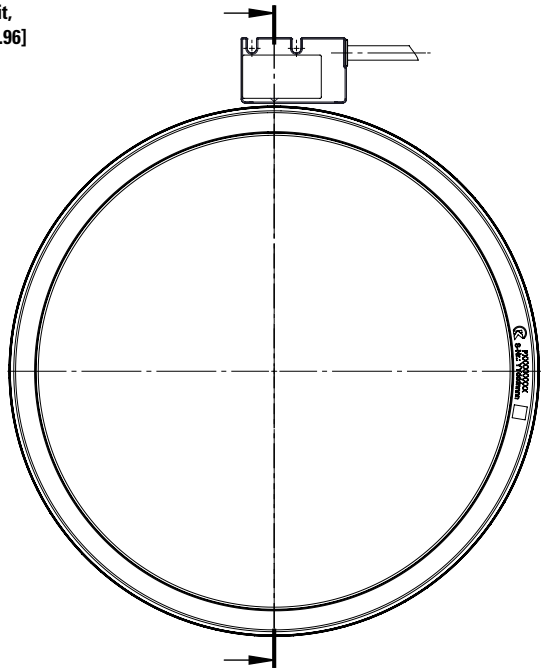
Incremental, standard magnetic	RIM200 / RIM500 (hollow shaft)	Push-pull / RS422 / SinCos

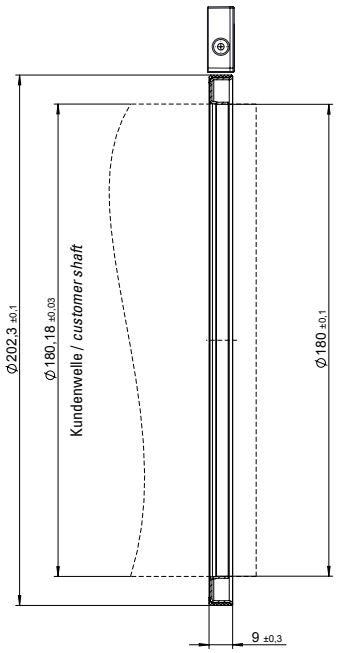
Dimensions

Dimensions in mm [inch
Projection method 1

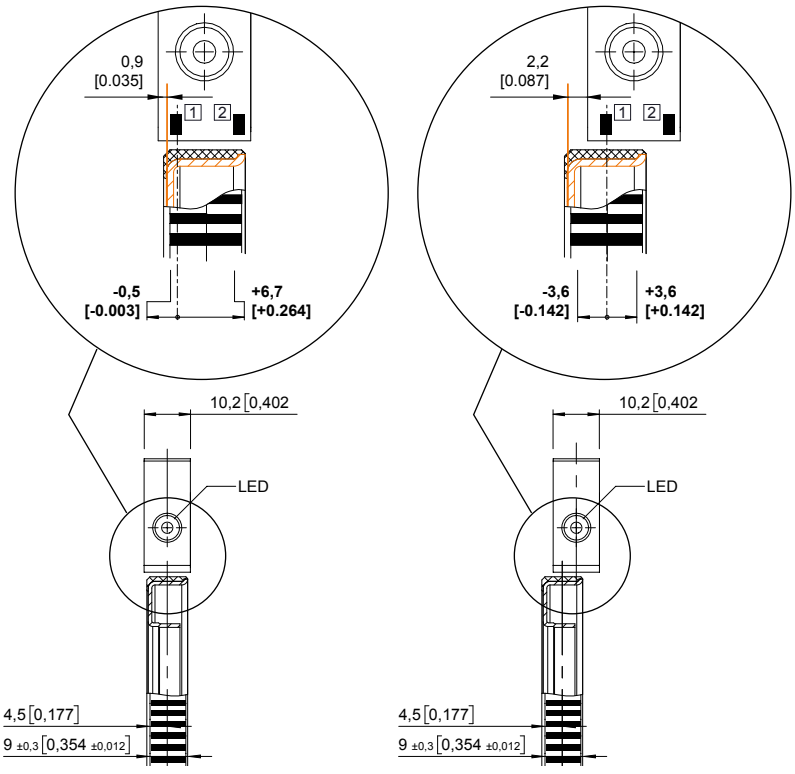


Magnetic ring with press fit, outer diameter 202.3 mm [7.96]

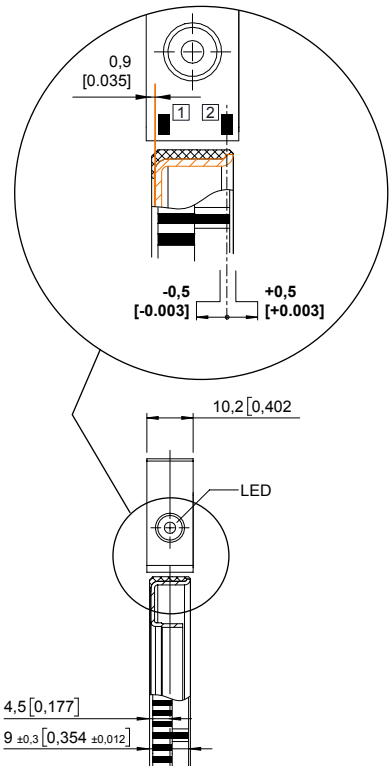




Tolerances for lateral offset when using a magnetic ring without additional reference track



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



1 Sensor element incremental track
2 Sensor element reference track

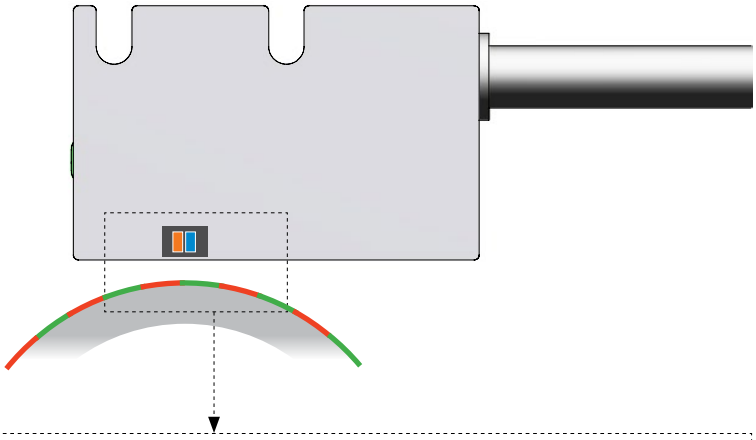
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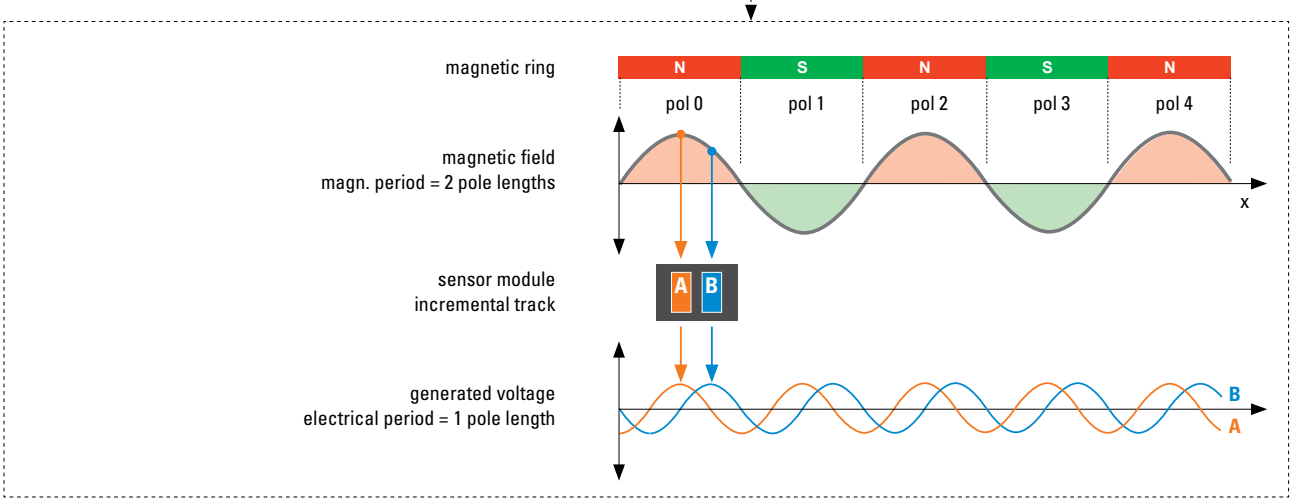
Incremental, standard magnetic | **RIM200 / RIM500 (hollow shaft)** | **Push-pull / RS422 / SinCos**

Technology in detail

Functional principle

The sensor module for the incremental track detects two sinusoidal input signals, which are offset by 1/4 of the pulse length, as input signals A and B.
–> 90° phase shift





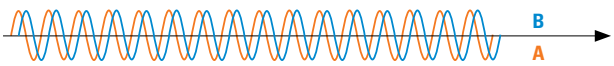
RS422 / TTL
Push-Pull / HTL

Square wave periods are generated from each input signal period in accordance with the resolution



SinCos

SinCos signals are generated from each input signal period in accordance with the resolution



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