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
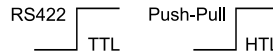
Features and benefits

- **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 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 / IP69k, Resistance to cyclical humidity acc. to EN 60068-3-38 and humidity-heat acc. to EN 60068-3-78).

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.

1 mm
2 mm
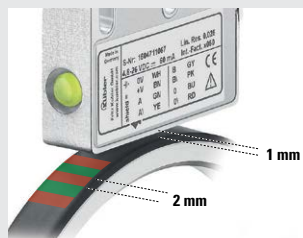
RIM500

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.

2 mm
5 mm
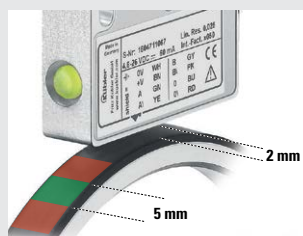
Selection of magnetic ring

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.

Bearingless encoders

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Order code RIM200

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

8.RIM200.XXXXA.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 / IP69k and humidity tested acc. to EN 60068-3-38, EN 60068-3-78

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 **i**)

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']
0100 = 10 m [32.80']
0150 = 15 m [49.21'] (only with supply voltage >10 V)
0200 = 20 m [65.62'] (only with supply voltage >10 V)

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 **f** 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
						9.25	H7	00925		
						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	02875		
						30	H7	03000		

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

Outer diameter [mm] ±0.10	Width [mm] ±0.30	Number of poles	Order code **f** zero pulse [1]	Material hub	Order code **f** outer diameter	ø Bore [mm]		Order code **g** bore	max. speed min⁻¹	Magnet material
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	180	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.

Incremental, standard magnetic

RIM200 / RIM500 (hollow shaft)

Push-pull / RS422

Bestellschlüssel RIM500
Pole lenght 5 mm / distance between sensor head and magnetic ring max. 2 mm

8.RIM500	.XXXXA	.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 / IP69k and humidity tested acc. to EN 60068-3-38, EN 60068-3-78

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 **i**)

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']
0100 = 10 m [32.80']
0150 = 15 m [49.21'] (only with supply voltage >10 V)
0200 = 20 m [65.62'] (only with supply voltage >10 V)

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 **f** 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)

Outer diameter [mm] ±0.10	width [mm] ±0.30	number of poles	Order code **f** zero pulse [1]	material hub	order code **f** outer diameter	ø bore [mm]		order code **g** bore	max. speed min^{-1}	magnet material
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

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

Technical data

Mechanical characteristics

Maximum speed		12000 min^{-1}
Protection	Model 1	IP67 acc. to EN 60529
	Model 2	IP68 / IP69k acc. to EN 60529, DIN 40050-9 and humidity tested acc. to EN 60068-3-38, EN 60068-3-78
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)		aluminum
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 lenght of magnetic ring and sensor head do not match

Electrical characteristics

		RS422	Push-pull
Output circuit		RS422	Push-pull
Supply voltage		4.8 ... 26.4 VDC	4.8 ... 26.4 VDC
Power consumption (no load)		typ. 25 mA max. 60 mA	typ. 25 mA max. 60 mA
Permissible load / channel		120 Ohm	+/- 20 mA
Output frequency max.		300 kHz	100 kHz
Signal level	HIGH	min. 2.5 V	min. +V - 2.0 V
	LOW	max. 0.5 V	max. 0.5 V
Zero pulse		For magnetic rings with zero pulse, once per revolution. For full-track magnetic rings without zero pulse, every two poles.	
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

Terminal assignment

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

+V: Supply voltage encoder +V DC
0 V: Supply voltage encoder 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)
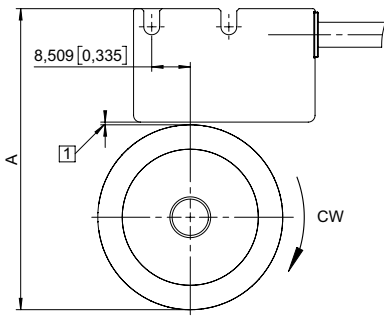
[1]   Shield is connected to sensor housing.

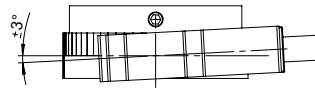| Incremental, standard magnetic	RIM200 / RIM500 (hollow shaft)	Push-pull / RS422

Mounting orientation and permissible mounting tolerances

Distances

8,509 [0,335]
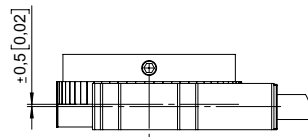
1

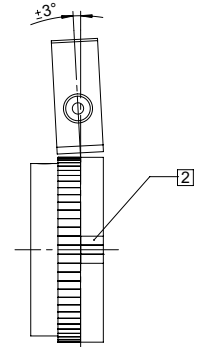A

CW

Torsion

+3°

Offset

± 0,5 [0,02]

Tilting

+3°

2

1 Distance sensor head / magnetic ring:
RIM200:   0.1 ... 1.0 mm (0.4 mm [0.016] recommended)
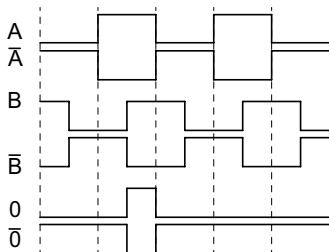RIM500:   0.1 ... 2.0 mm (1.0 mm [0.039] recommended)

2 Reference signal

A Depending on the magnetic ring used

Warning: When mounting the sensor head, please ensure its correct orientation to the magnetic ring (with reference signal)!

Signal figures

A vor B, when turning clockwise (see above, arrow cw)

A
Ā
B
B̄
0
0̄

Dimensions
Dimensions in mm [inch]

Sensor head

40 [1,575]
4 [0,157]
17 [0,669]
3,5 [0,138]
2x
5,8 [0,226]
10,2 [0,402]
15,2 [0,598]
25 [0,984]
4 [0,157]
8,5 [0,335]
5,1 [0,201]
1
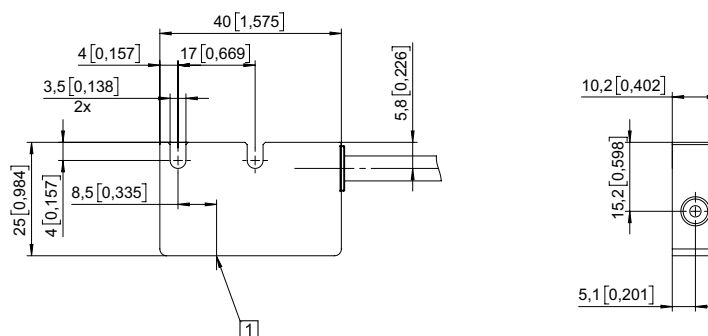
1 Active measuring area

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

Dimensions
Dimensions in mm [inch]

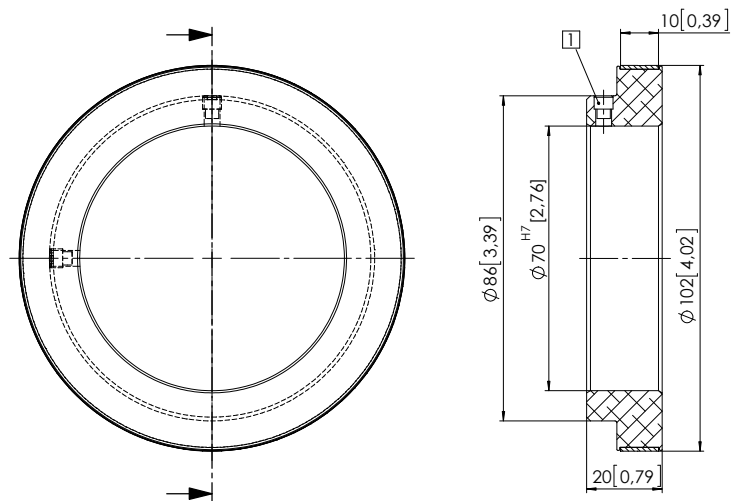**Magnetic ring with hub screw, outer diameter 31 mm [1.22] up to 54.7 mm [2.15]**

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	28	30	35	
31	•	•		•	•	•	•	•	•							28 / 29
40.74		•							•	•						28
41.2		•		•	•			•	•							28
45		•	•	•	•	•		•	•	•	•	•		•		38
48.3	•	•		•	•	•			•	•	•		•	•		46
50.11								•								40
54.7	•	•			•	•			•	•				•	•	53
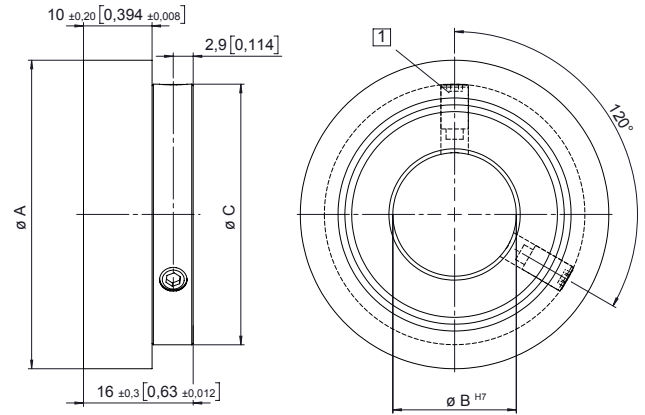
1 Set screw M4

Recommended tolerance of the drive shaft diameter: g6

10 ±0,20 [0,394 ±0,008]
2,9 [0,114]
ø A
ø C
16 ±0,3 [0,63 ±0,012]
120°
ø B H7

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

1 Set screw M5

10 [0,39]
ø 86 [3,39]
ø 70 H7 [2,76]
ø 102 [4,02]
20 [0,79]

Magnetic ring (press fit)

ø A [mm] ±0.10 Outer diameter	ø B [mm] Bore		C [mm] ±0.30 Width	ø D [mm] Customer shaft + recommended tolerance
48.90	45.4	±0.05	10.40	45.50 m6
87.13	76	H7	9	76 r6
202.30	180	±0.10	9	180.18 ±0.03

ø A
ø D
ø B
C