

# Bearingless encoders

**Incremental, standard magnetic**

**RI20 / Limes LI20 (hollow shaft)**

**Push-pull / RS422**



Thanks to its installation depth of only 16 mm, the bearingless magnetic rotary encoder RI20 / Limes LI20, comprising a magnetic ring and sensor head, is ideally suited for plants and machinery where space is very tight. The non-contact measuring principle allows for error-free use even under harsh environmental conditions, as well as ensuring a long service life.

For outdoor use with extremely sturdy aluminum housing and stainless steel cover, wide temperature range as well as a UV-resistant cable. IP68 / IP69k protection, special encapsulation technology and tested resistance to cyclic humidity and damp heat offer the highest levels of reliability, even in exposed outdoor use.



High rotational speed



High protection level



Shock / vibration resistant



Reverse polarity protection

## Hard-wearing and robust

- High shock and vibration resistance.
- Sturdy housing with IP67 protection. Option: special housing for maximum resistance against condensation (IP68 / IP69k, resistance to cyclic humidity acc. to EN 60068-3-38 as well as damp heat acc. to EN 60068-3-78).
- Non-contact measuring system, free from wear, ensures a long service life.

## Fast start-up

- Requires very little installation space.
- Large mounting tolerance between magnetic band and sensor head.
- Slotted hole fixing ensures simple alignment.
- Function display via LED.

## Selection guide magnetic ring RI20 / Limes LI20

Pulses per revolution <sup>1)</sup> (further ppr on request)	Order code magnetic ring RI20	Order code sensor head Limes LI20	Max. rotational speed min <sup>-1</sup> <sup>2)</sup>
250	8.RI20.031.XXXX.111	8.LI20.11X1.2005	12 000
1 000	8.RI20.031.XXXX.111	8.LI20.11X1.2020	2 400
2 500	8.RI20.031.XXXX.111	8.LI20.11X1.2050	3 900
1 024	8.RI20.041.XXXX.111	8.LI20.11X1.2016	7 000
360	8.RI20.045.XXXX.111	8.LI20.11X1.2005	12 000
3 600	8.RI20.045.XXXX.111	8.LI20.11X1.2050	2 700

## Order code Magnetic ring RI20

8.RI20 . XXX . XXXX . 111  
Type                    a                    b

Min. order quantity for non-stock types: 10 pieces

### a Outer diameter

031 = 31 mm [1.22"]  
041 = 41.2 mm [1.62"]  
045 = 45 mm [1.77"]

### b Bore diameter

0800 = 8 mm [0.32"]      1800 = 18 mm [0.71"]      0952 = 3/8"  
1000 = 10 mm [0.39"]      2000 = 20 mm [0.79"]      1587 = 5/8"  
1200 = 12 mm [0.47"]      2500 = 25 mm [0.98"] <sup>3)</sup>      2540 = 1" <sup>3)</sup>  
1500 = 15 mm [0.59"]      3000 = 30 mm [1.18"] <sup>3)</sup>

### Stock types

8.RI20.031.0800.111  
8.RI20.031.1000.111  
8.RI20.031.1200.111  
8.RI20.031.1500.111  
8.RI20.041.0800.111  
8.RI20.045.1200.111  
8.RI20.045.1500.111  
8.RI20.045.2500.111  
8.RI20.045.2540.111  
8.RI20.045.3000.111

1) The pulse rate (ppr) results from the combination of the magnetic sensor with the various outer diameters.

2) With an input frequency of the evaluation unit of 250 kHz.

3) Only possible for outer diameter 045.

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<b>Order code</b> Sensor head Limes LI20	<table border="1" style="margin: auto;"> <tr> <td style="padding: 2px;">8</td> <td style="padding: 2px;">.</td> <td style="padding: 2px;">X</td> <td style="padding: 2px;">1</td> <td style="padding: 2px;">X</td> <td style="padding: 2px;">X</td> <td style="padding: 2px;">.</td> <td style="padding: 2px;">2</td> <td style="padding: 2px;">XXX</td> </tr> <tr> <td style="font-size: 8px;">Type</td> <td></td> <td style="font-size: 8px;">a</td> <td></td> <td style="font-size: 8px;">b</td> <td style="font-size: 8px;">c</td> <td></td> <td style="font-size: 8px;">d</td> <td style="font-size: 8px;">e</td> </tr> </table>	8	.	X	1	X	X	.	2	XXX	Type		a		b	c		d	e	
8	.	X	1	X	X	.	2	XXX												
Type		a		b	c		d	e												
<b>a</b> Model 1 = IP67, standard 2 = IP68 / IP69k and humidity tested acc. to EN 60068-3-38, EN 60068-3-78  <b>b</b> Output circuit / power supply 1 = RS422 / 4.8 ... 26 V DC 2 = Push-pull / 4.8 ... 30 V DC	<b>c</b> Type of connection 1 = cable, 2 m [6.56'] PUR A = radial cable, special length PUR *) *) Available special lengths (connection type A): 3, 5, 8, 10, 15 m [9.84, 16.40, 26.25, 32.80, 49.21'] order code expansion .XXXX = length in dm ex.: 8.LI20.111A.2005.0030 (for cable length 3 m)	<b>d</b> Reference signal 2 = Index periodical  <b>e</b> Interpolation factor 005, 016, 020, 050	<b>Stock types</b> 8.LI20.1111.2005 8.LI20.1111.2020 8.LI20.1111.2050 8.LI20.1121.2005 8.LI20.1121.2020 8.LI20.1121.2050																	

Accessories / Display type 572	Order no.
<b>Position display, 6-digit</b>	
with 4 fast switch outputs and serial interface	<b>6.572.0116.D05</b>
with 4 fast switch outputs and serial interface and scalable analog output	<b>6.572.0116.D95</b>
<b>Position display, 8-digit</b>	
with 4 fast switch outputs and serial interface	<b>6.572.0118.D05</b>
with 4 fast switch outputs and serial interface and scalable analog output	<b>6.572.0118.D95</b>

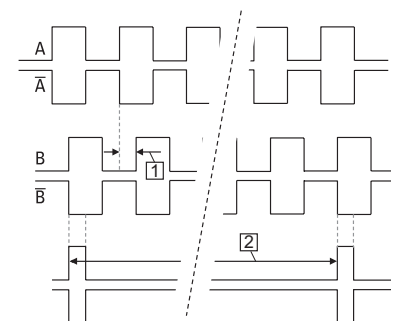
Further accessories can be found in the accessories section or in the accessories area of our website at: [www.kuebler.com/accessories](http://www.kuebler.com/accessories).  
 Additional connectors can be found in the connection technology section or in the connection technology area of our website at: [www.kuebler.com/connection\\_technology](http://www.kuebler.com/connection_technology).

## Technical data

Mechanical characteristics	
<b>Maximum speed</b>	12000 min <sup>-1</sup>
<b>Protection</b>	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
<b>Working temperature</b>	-20°C ... +80°C [-4°F ... +176°F]
<b>Shock resistance</b>	5000 m/s <sup>2</sup> , 1 ms
<b>Vibration resistance</b>	300 m/s <sup>2</sup> , 10 ... 2000 Hz
<b>Pole gap</b>	2 mm from pole to pole
<b>Housing (sensor head)</b>	aluminum
<b>Cable</b>	2 m [6.56'] long, PUR 8 x 0.14 mm <sup>2</sup> [AWG 26], shielded, may be used in trailing cable installations
<b>Status LED</b>	green pulse-index red error; speed too high or magnetic fields too weak (8.LI20.XXXX.X050 and 8.LI20.XXXX.X250)
<b>CE compliant acc. to</b>	EMC guideline 2014/30/EU RoHS guideline 2011/65/EU

### Signal figures

- 1) Pulse edge interval:  
Pay attention to the instructions in the technical data
- 2) Periodic index signal every 2 mm [0.08"]; the logical assignment A, B and 0-signal can change



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Electrical characteristics		
<b>Output circuit</b>	<b>RS422</b>	<b>Push-pull</b>
<b>Power supply</b>	4.8 ... 26 VDC	4.8 ... 30 VDC
<b>Power consumption (no load)</b>	typ. 25 mA max. 60 mA	typ. 25 mA max. 60 mA
<b>Permissible load / channel</b>	120 Ohm	+/- 20 mA
<b>Min. pulse edge interval</b>	1 µs	
<b>Signal level</b>	HIGH min. 2.5 V LOW max. 0.5 V	min. +V - 2.0 V max. 0.5 V
<b>Reference signal</b>	index periodical <sup>1)</sup>	
<b>System accuracy</b>	typ. 0.3° with shaft tolerance g6	

1) At every pole change. The signal is generated by the sensor.

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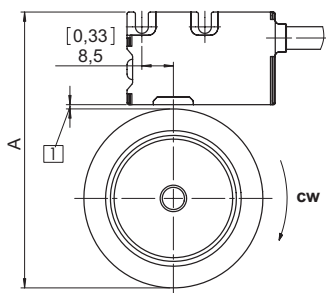
## Terminal assignment

Output circuit	Type of connection	Cable (isolate unused wires individually before initial start-up)									
1, 2	1, A	Signal:	0 V	+V	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	$\perp$
		Cable color:	WH	BN	GN	YE	GY	PK	BU	RD	shield <sup>1)</sup>

- +V: Encoder power supply +V DC
- 0 V: Encoder power supply 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
- $\perp$ : Plug connector housing (shield)

## Mounting orientation and permissible mounting tolerances

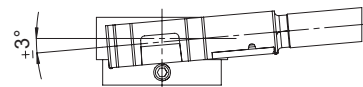
### Distances



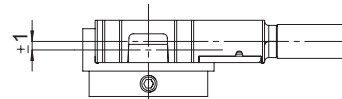
1 Distance sensor head / magnetic ring:  
0.1 ... 1.0 (0.4 [0.02] recommended)

Magnetic ring	A for distance sensor head / magnetic ring: = 0.4 [0.02]
8.RI20.031.XXXX.111	56.4 [2.22]
8.RI20.041.XXXX.111	66.6 [2.62]
8.RI20.045.XXXX.111	70.4 [2.77]

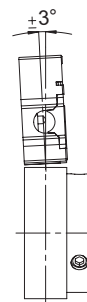
### Torsion



### Offset



### Tilting



**Warning: When mounting the sensor head, please ensure its correct orientation to the magnetic ring!**

1) Shield is attached to connector housing.

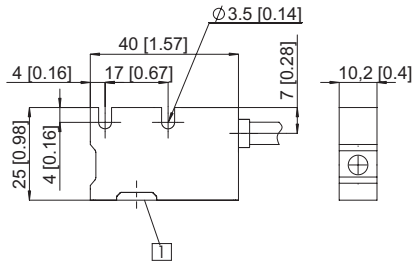
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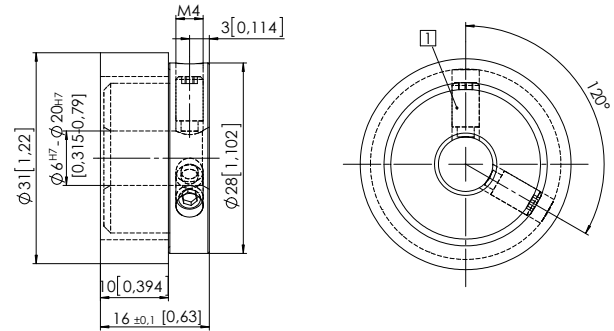
## Dimensions

Dimensions in mm [inch]

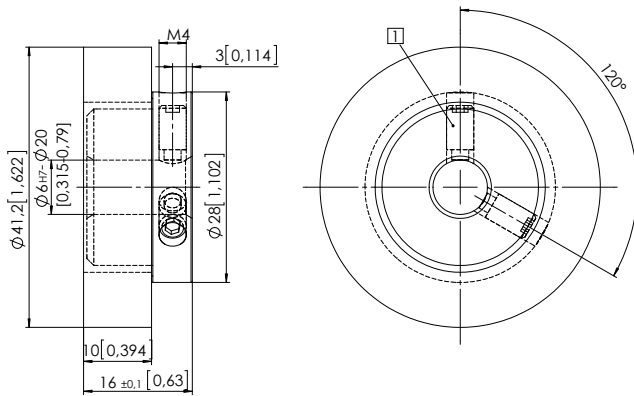
**Sensor head Limes LI20**



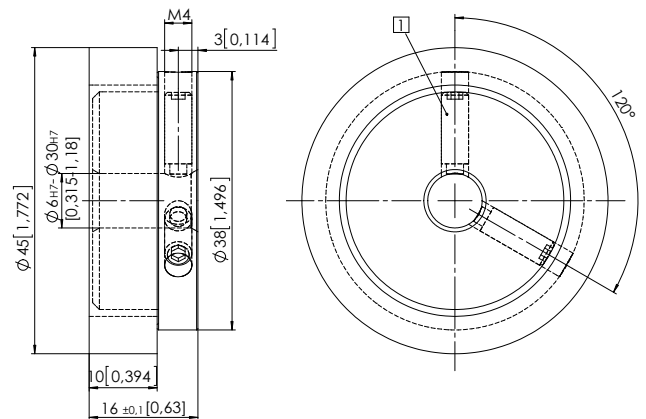
**Magnetic ring, ø 31 [1.22], 8.RI20.031.XXXX.111**



**Magnetic ring, ø 41.2 [1.62], 8.RI20.041.XXXX.111**



**Magnetic ring, ø 45 [1.77], 8.RI20.045.XXXX.111**



**I** Set screw M4

Recommended tolerance of the drive shaft diameter: g6

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