

# Absolute encoders - singleturn

<b>Compact magnetic</b>	<b>Sendix 3651 / 3671 (shaft / hollow shaft)</b>	<b>Analog</b>
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Thanks to their different interfaces and measurement ranges, the Sendix 3651 and Sendix 3671 singleturn encoders with analog interface, in shaft and hollow shaft versions, are particularly flexible in use. A green and a red LED, acting as reference point and fault indicators, ensure easy installation and troubleshooting.

Protected up to IP69k, resistance against shock and extreme temperature fluctuations, the Sendix are suitable even for demanding outdoor applications.

These encoders have an E1-approval from the German Federal Motor Transport Authority.



Safety-Lockplus™	High rotational speed	Temperature range	High protection level	High shaft load capacity	Shock / vibration resistant	Short-circuit proof	Reverse polarity protection	Magnetic sensor	Surface protection salt spray-tested optional

## Safe operation

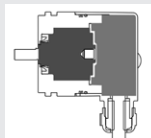
- Non-contact measuring system for long-life non-wear applications.
- Rugged die-cast-housing and protection up to IP69k for an exceptional tightness.
- High shock and vibration resistance for an exceptional robustness.

## Compact and powerful

- Outer diameter of only 36 mm.
- The hollow shaft version is fitted with a blind hole with a diameter of up to 10 mm. It can be mounted as required with either a torque stop pin or a stator coupling.
- 360° with 12 bit resolution (4096 positions).
- For use in 12 V or 24 V vehicle electrical systems.

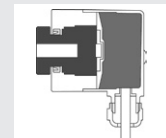
## Safety-Lockplus™

IP69k protection on the flange side, robust bearing assemblies with interlocking bearings, mechanically protected shaft seal.



## Sensor-Protect™

Fully encapsulated electronics, separate mechanical bearing assembly.



<b>Order code</b>	<b>8.3651</b>	<b>. 2XXXX . XXXXX</b>
<b>Shaft version</b>	Type	a b c d e f g h

### a Flange

2 = synchro flange,  $\varnothing$  36 mm [1.42"]

### b Shaft ( $\varnothing \times L$ ), with flat

3 =  $\varnothing$  6 x 12.5 mm [0.24 x 0.49"]

6 =  $\varnothing$  8 x 12.5 mm [0.32 x 0.49"]

5 =  $\varnothing$  1/4" x 12.5 mm [0.49"]

### c Output circuit <sup>1)</sup>

3 = current output

4 = voltage output

### d Type of connection

1 = axial cable, 1 m [3.28'] PUR

A = axial cable, special length PUR \*)

2 = radial cable, 1 m [3.28'] PUR

B = radial cable, special length PUR \*)

3 = axial M12 connector, 5-pin

4 = radial M12 connector, 5-pin

\*) Available special lengths (connection types A, B):

2, 3, 5, 8, 10, 15 m [6.56, 9.84, 16.40, 26.25, 32.80, 49.21']

order code expansion .XXXX = length in dm

ex.: 8.3651.233A.1311.0030 (for cable length 3 m)

### e Measuring range

1 = 1 x 360°

2 = 1 x 180°

3 = 1 x 90°

4 = 1 x 45°

### f Interface / supply voltage

3 = 4 ... 20 mA / 10 ... 30 V DC

4 = 0 ... 10 V / 15 ... 30 V DC

5 = 0 ... 5 V / 10 ... 30 V DC

### g Option 1

1 = count direction cw <sup>2)</sup>

2 = count direction ccw <sup>3)</sup>

### h Option 2

1 = IP67

2 = IP69k

*Optional on request*

- Ex 2/22 (only for type of connection 3 + 4)

- surface protection salt spray tested

1) Output circuit "3" only in conjunction with interface "3", output circuit "4" only in conjunction with interface "4" or "5".

2) cw = Increasing code values when shaft turning clockwise (cw). Top view on shaft.

3) ccw = Increasing code values when shaft turning counterclockwise (ccw). Top view on shaft.

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<b>Order code</b> Hollow shaft	<b>8.3671</b> Type	<table border="1" style="font-size: 8px; border-collapse: collapse; width: 100%;"> <tr> <td style="text-align: center;">X</td><td style="text-align: center;">X</td><td style="text-align: center;">X</td><td style="text-align: center;">X</td> <td style="text-align: center;">X</td><td style="text-align: center;">X</td><td style="text-align: center;">X</td><td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;">a</td><td style="text-align: center;">b</td><td style="text-align: center;">c</td><td style="text-align: center;">d</td> <td style="text-align: center;">e</td><td style="text-align: center;">f</td><td style="text-align: center;">g</td><td style="text-align: center;">h</td> </tr> </table>	X	X	X	X	X	X	X	X	a	b	c	d	e	f	g	h	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; vertical-align: top; padding: 2px;"> <p><b>a</b> Flange 2 = with spring element, long 5 = with stator coupling, <math>\varnothing</math> 46 mm [1.81"]</p> <p><b>b</b> Blind hollow shaft (insertion depth max. 18 mm [0.71"]) 2 = <math>\varnothing</math> 6 mm [0.24"] 4 = <math>\varnothing</math> 8 mm [0.32"] 6 = <math>\varnothing</math> 10 mm [0.39"] 3 = <math>\varnothing</math> 1/4"</p> <p><b>c</b> Output circuit<sup>1)</sup> 3 = current output 4 = voltage output</p> </td> <td style="width: 33%; vertical-align: top; padding: 2px;"> <p><b>d</b> Type of connection 1 = axial cable, 1 m [3.28'] PUR A = axial cable, special length PUR *) 2 = radial cable, 1 m [3.28'] PUR B = radial cable, special length PUR *) 3 = axial M12 connector, 5-pin 4 = radial M12 connector, 5-pin  *) Available special lengths (connection types A, B): 2, 3, 5, 8, 10, 15 m [6.56, 9.84, 16.40, 26.25, 32.80, 49.21'] order code expansion .XXXX = length in dm ex.: 8.3671.523A.1311.0030 (for cable length 3 m)</p> <p><b>e</b> Measuring range 1 = 1 x 360° 2 = 1 x 180° 3 = 1 x 90° 4 = 1 x 45°</p> </td> <td style="width: 33%; vertical-align: top; padding: 2px;"> <p><b>i</b> Interface / supply voltage 3 = 4 ... 20 mA / 10 ... 30 V DC 4 = 0 ... 10 V / 15 ... 30 V DC 5 = 0 ... 5 V / 10 ... 30 V DC</p> <p><b>g</b> Option 1 1 = count direction cw<sup>2)</sup> 2 = count direction ccw<sup>3)</sup></p> <p><b>h</b> Option 2 1 = IP67 2 = IP69k</p> <p style="text-align: center;"><i>Optional on request</i></p> <ul style="list-style-type: none"> <li>- Ex 2/22 (only for type of connection 3 + 4)</li> <li>- surface protection salt spray tested</li> </ul> </td> </tr> </table>	<p><b>a</b> Flange 2 = with spring element, long 5 = with stator coupling, <math>\varnothing</math> 46 mm [1.81"]</p> <p><b>b</b> Blind hollow shaft (insertion depth max. 18 mm [0.71"]) 2 = <math>\varnothing</math> 6 mm [0.24"] 4 = <math>\varnothing</math> 8 mm [0.32"] 6 = <math>\varnothing</math> 10 mm [0.39"] 3 = <math>\varnothing</math> 1/4"</p> <p><b>c</b> Output circuit<sup>1)</sup> 3 = current output 4 = voltage output</p>	<p><b>d</b> Type of connection 1 = axial cable, 1 m [3.28'] PUR A = axial cable, special length PUR *) 2 = radial cable, 1 m [3.28'] PUR B = radial cable, special length PUR *) 3 = axial M12 connector, 5-pin 4 = radial M12 connector, 5-pin  *) Available special lengths (connection types A, B): 2, 3, 5, 8, 10, 15 m [6.56, 9.84, 16.40, 26.25, 32.80, 49.21'] order code expansion .XXXX = length in dm ex.: 8.3671.523A.1311.0030 (for cable length 3 m)</p> <p><b>e</b> Measuring range 1 = 1 x 360° 2 = 1 x 180° 3 = 1 x 90° 4 = 1 x 45°</p>	<p><b>i</b> Interface / supply voltage 3 = 4 ... 20 mA / 10 ... 30 V DC 4 = 0 ... 10 V / 15 ... 30 V DC 5 = 0 ... 5 V / 10 ... 30 V DC</p> <p><b>g</b> Option 1 1 = count direction cw<sup>2)</sup> 2 = count direction ccw<sup>3)</sup></p> <p><b>h</b> Option 2 1 = IP67 2 = IP69k</p> <p style="text-align: center;"><i>Optional on request</i></p> <ul style="list-style-type: none"> <li>- Ex 2/22 (only for type of connection 3 + 4)</li> <li>- surface protection salt spray tested</li> </ul>
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Mounting accessory for shaft encoders	Order no.
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<b>Coupling</b> Bellows coupling $\varnothing$ 19 mm [0.75"] for shaft 6 mm [0.24"]	<b>8.0000.1102.0606</b>
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Mounting accessory for hollow shaft encoders	Dimensions in mm [inch]	Order no.
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<b>Torque pin, <math>\varnothing</math> 4 mm</b> for flange with spring element (flange type 3 + 6)	with fixing thread	<b>8.0010.4700.0000</b>
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Cables and connectors	Order no.
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<b>Preassembled cables</b> M12 female connector with coupling nut, 5-pin, A coded, straight open ended 2 m [6.56'] PVC cable	<b>05.00.6081.2211.002M</b>
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<b>Connectors</b> M12 female connector with coupling nut, 5-pin, A coded, straight (metal)	<b>8.0000.5116.0000</b>
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Further Kübler accessories can be found at: [kuebler.com/accessories](http://kuebler.com/accessories)  
 Further Kübler cables and connectors can be found at: [kuebler.com/connection-technology](http://kuebler.com/connection-technology)

1) Output circuit "3" only in conjunction with interface "3",  
output circuit "4" only in conjunction with interface "4" or "5".

2) cw = increasing code values when shaft turning clockwise (cw). Top view on shaft.  
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## Technical data

Electrical characteristics current interface 4 ... 20 mA		
<b>Sensor</b>		
<b>Supply voltage</b>	10 ... 30 V DC	
<b>Current consumption (no load)</b>	max. 38 mA	
<b>Reverse polarity protection of the supply voltage</b>	yes	
<b>Measuring range</b>	45°, 90°, 180° or 360°	
<b>Resolution</b>	12 bit	
<b>Absolute accuracy, 25 °C [77 °F]</b>	±1°	
<b>Repeat accuracy, 25 °C [77 °F]</b>	±0.2°	
<b>Status LED</b>	red	break in current loop, input load too high.
	green	reference point display turns ON at cw: betw. 0° and 1° at ccw: betw. 0° and -1°
<b>Current loop Output load</b>	max. 200 Ohm at 10 V DC max. 900 Ohm at 24 V DC	
<b>Setting time</b>	< 1 ms $R_{load} = 400 \text{ Ohm}, 25 \text{ °C [77 °F]}$	
<b>Short-circuit proof outputs</b> When the supply voltage is correctly applied. But not output to +V. Supply voltage and sensor output signal are not galvanically isolated.		

Electrical characteristics voltage interface		
<b>Sensor</b>		
<b>Supply voltage</b>	output 0 ... 5 V	10 ... 30 V DC
	output 0 ... 10 V	15 ... 30 V DC
<b>Current consumption (no load)</b>	max. 35 mA	
<b>Reverse polarity protection of the supply voltage</b>	yes	
<b>Measuring range</b>	45°, 90°, 180° or 360°	
<b>Resolution</b>	12 bit	
<b>Linearity, 25 °C [77 °F]</b>	±1°	
<b>Repeat accuracy, 25 °C [77 °F]</b>	±0.2°	
<b>Voltage output</b>		
<b>Current output</b>	max. 10 mA	
<b>Setting time</b>	< 1 ms $R_{load} \geq 1 \text{ KOhm}, 25 \text{ °C [77 °F]}$	
<b>Short-circuit proof outputs</b> When the supply voltage is correctly applied. But not output to +V. Supply voltage and sensor output signal are not galvanically isolated.		

Mechanical characteristics		
<b>Maximum speed</b>	6000 min <sup>-1</sup>	
<b>Starting torque at 20 °C [68 °F]</b>	< 0.06 Nm	
<b>Shaft load capacity</b>	radial	40 N
	axial	20 N
<b>Weight</b>	approx. 0.2 kg [7.06 oz]	
<b>Protection acc. to EN 60529</b>	IP67 / IP69k	
<b>Working temperature range</b>	-40 °C ... +85 °C [-40 °F ... +185 °F]	
<b>Materials</b>	shaft / hollow shaft	stainless steel
	flange	aluminum
	housing	zinc die-cast
	cable	PUR
<b>Shock resistance acc. to EN 60068-2-27</b>	5000 m/s <sup>2</sup> , 6 ms	
<b>Vibration resistance acc. to EN 60068-2-6</b>	300 m/s <sup>2</sup> , 10 ... 2000 Hz	
<b>Permanent shock resistance acc. to EN 60068-2-27</b>	1000 m/s <sup>2</sup> , 2 ms	
<b>Vibration (broad-band random) acc. to EN 60068-2-64</b>	5 ... 2500 Hz, 100 m/s <sup>2</sup> - rms	

Approvals		
<b>E1 compliant</b> in accordance with	ECE guideline	
<b>UL compliant</b> in accordance with	File no. E224618	
<b>CE compliant</b> in accordance with		
	EMC Directive	2014/30/EU
	RoHS Directive	2011/65/EU
	ATEX Directive	2014/34/EU (for Ex 2/22 variants)

Status LED (green)		
<b>Status LED</b>	green	reference point display turns ON at cw: betw. 0° and 1° at ccw: betw. 0° and -1°

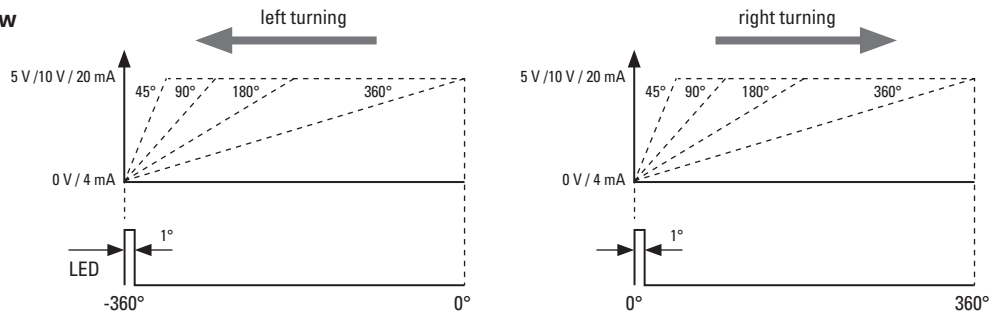
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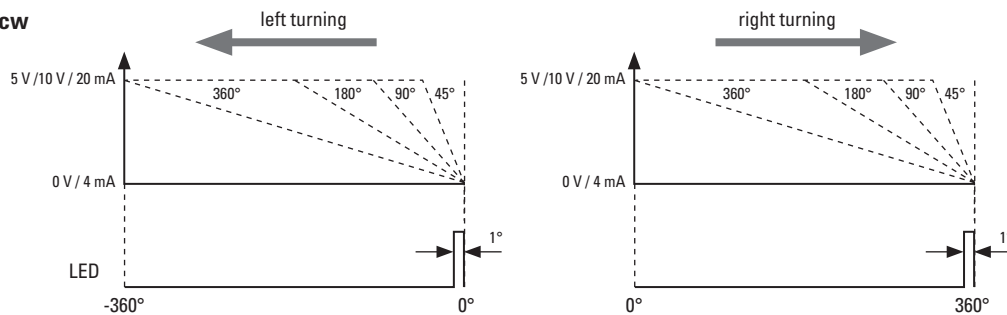
## Example (output signal profile)

Measurement range 45° / 90° / 180° / 360°

### Version cw



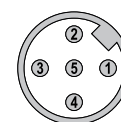
### Version ccw



## Terminal assignment

Interface 3 (current)	Type of connection 1, 2, A, B	Cable (isolate unused cores individually before initial start-up)				
		Signal:	0 V	+V	+I	-I
		Core color:	WH	BN	GN	YE
Interface 3 (current)	Type of connection 3, 4	M12 connector, 5-pin				
		Signal:	0 V	+V	+I	-I
		Pin:	3	2	4	5
Interface 4, 5 (voltage)	Type of connection 1, 2, A, B	Cable (isolate unused cores individually before initial start-up)				
		Signal:	0 V	+V	+U	-U
		Core color:	WH	BN	GN	YE
Interface 4, 5 (voltage)	Type of connection 3, 4	M12 connector, 5-pin				
		Signal:	0 V	+V	+U	-U
		Pin:	3	2	4	5

Top view of mating side, male contact base



M12 connector, 5-pin

- +V : Supply voltage encoder +V DC
- 0 V : Supply voltage encoder ground GND (0 V)
- +U / -U : Voltage + / voltage -
- +I / -I : Current + / current -

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## Dimensions shaft version

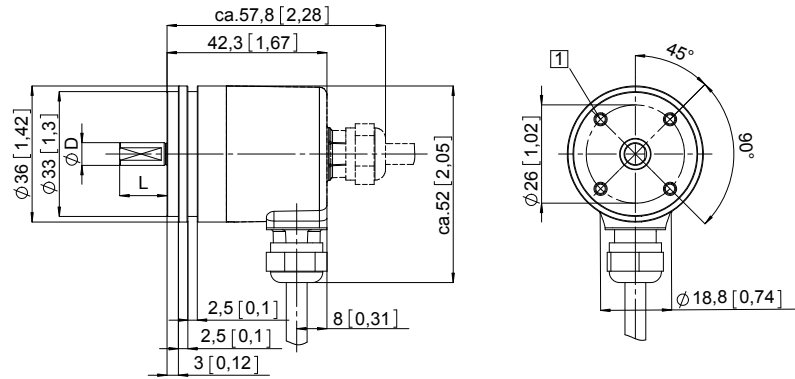
Dimensions in mm [inch]

### Synchro flange, ø 36 [1.42]

#### Flange type 2

(drawing with cable)

1 4 x M3, 6 [0.24] deep



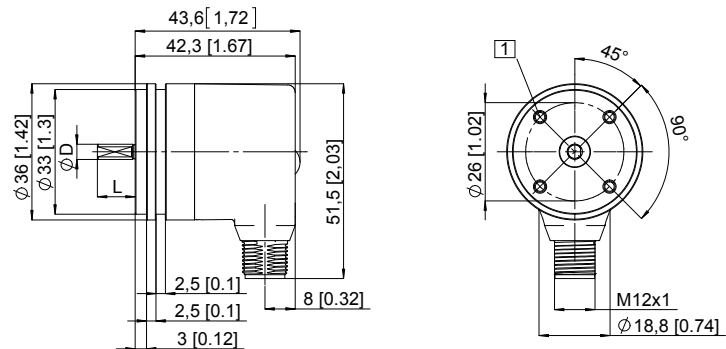
D	Fit	L
6 [0.24]	h7	12.5 [0.49]
8 [0.32]	h7	12.5 [0.49]
1/4"	h7	12.5 [0.49]

### Synchro flange, ø 36 [1.42]

#### Flange type 2

(drawing with M12 connector)

1 4 x M3, 6 [0.24] deep



D	Fit	L
6 [0.24]	h7	12.5 [0.49]
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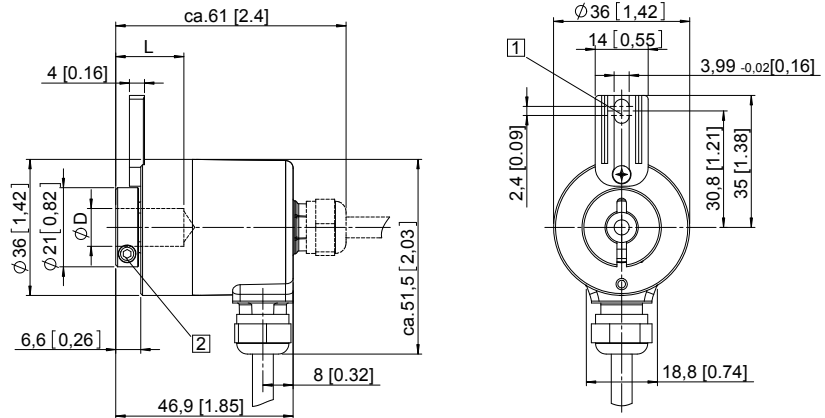
**Analog**

## Dimensions hollow shaft version

Dimensions in mm [inch]

### Flange with spring element, long Flange type 2

- 1 Slot spring element, recommendation: torque pin DIN 7,  $\varnothing$  4 [0.16]
- 2 Recommended torque for the clamping ring 0.7 Nm

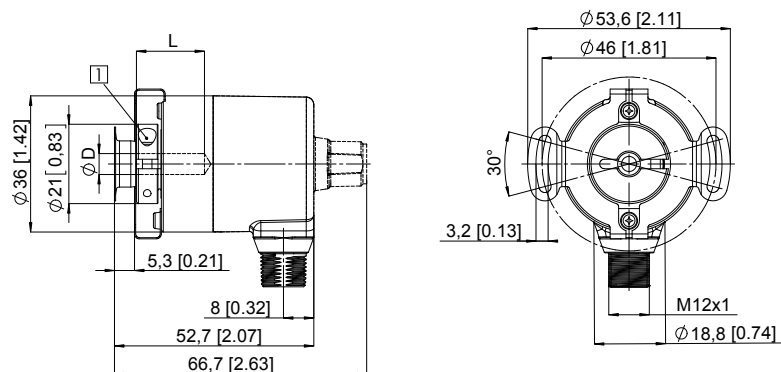


D	Fit	L
6 [0.24]	H7	18 [0.71]
8 [0.32]	H7	18 [0.71]
10 [0.39]	H7	18 [0.71]
1/4"	H7	18 [0.71]

L = insertion depth blind hollow shaft

### Flange with stator coupling, $\varnothing$ 46 [1.81] Flange type 5

- 1 Recommended torque for the clamping ring 0.7 Nm



D	Fit	L
6 [0.24]	H7	18 [0.71]
8 [0.32]	H7	18 [0.71]
10 [0.39]	H7	18 [0.71]
1/4"	H7	18 [0.71]

L = insertion depth blind hollow shaft