

# Incremental encoders

<b>Standard, ATEX/IECEX – zone 1/21 optical</b>	<b>Sendix 7000 / 7020 (shaft / hollow shaft)</b>	<b>Push-pull / RS422</b>
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The Sendix 7000 / 7020 incremental encoders offer Ex protection in a compact 70 mm seawater durable aluminum housing.

These shock and vibration resistant encoders operate flexibly with a resolution of up to 5000 pulses per rotation; they are also available with axial and radial cable outlets.



Ex approval	Safety-Lock™	High rotational speed	High protection level	High shaft load capacity	Shock / vibration resistant	Magnetic field proof	Short-circuit proof	Reverse polarity protection	Optical sensor	Seawater durable

### Compact and safe

- Can be used even when space is tight.
- Minimal installation depth, diameter 70 mm.
- Compact cable outlet axial or radial.
- Can be operated in marine environments – housing and flange manufactured from seawater durable aluminum.
- Remains sealed even in harsh everyday use and ensures highest safety against field breakdowns (IP67 protection).

### Explosion protection

- “Flameproof-enclosure” version.
- ATEX with EU type examination certificate.
- IECEX with certificate of conformity (CoC).

<b>Order code</b>	<b>8.7000</b>	<b>. 1</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>. XXXX</b>	<b>. XXXX</b>
<b>Shaft version</b>	Type	a	b	c	d	e	f

- |   |  |   |
|---|--|---|
| <p><b>a</b> Flange<br/>1 = clamping / synchronous flange, IP67, ø 70 mm [2.76"]</p> <p><b>b</b> Shaft (ø x L)<br/>2 = 10 x 20 mm [0.39 x 0.79"], with flat<br/>1 = 12 x 25 mm [0.47 x 0.98"], with keyway for 4 x 4 mm [0.16 x 0.16"] key</p> <p><b>c</b> Output circuit / supply voltage<br/>4 = RS422 (with inverted signal) / 5 V DC<br/>1 = RS422 (with inverted signal) / 5 ... 30 V DC<br/>2 = push-pull (7272 compatible with inverted signal) / 5 ... 30 V DC<br/>5 = push-pull (with inverted signal) / 10 ... 30 V DC</p> | <p><b>d</b> Type of connection<br/>1 = axial cable, 2 m [6.56'] PUR<br/>2 = radial cable, 2 m [6.56'] PUR<br/>A = axial cable, length &gt; 2 m [6.56']<br/>B = radial cable, length &gt; 2 m [6.56']</p> <p><b>e</b> Pulse rate<br/>1, 5, 10, 12, 36, 50, 100, 200, 250, 256, 300, 360, 400, 500, 512, 600, 800, 1000, 1024, 1200, 2000, 2048, 2500, 3600, 4096, 5000 (e.g. 100 pulses =&gt; 0100)</p> | <p><b>f</b> Cable length in dm<sup>1)</sup><br/>0050 = 5 m [16.40']<br/>0100 = 10 m [32.81']<br/>0150 = 15 m [49.21']</p> <p><i>Optional on request</i><br/>- other pulse rates<br/>- special cable length<br/>- seawater resistant (stainless steel V4A)</p> |
|---|--|---|

1) Not applicable with connection types 1 and 2.

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<b>Order code</b>	<b>8.7020</b>	<b>.XXXXX</b>	<b>.XXXX</b>	<b>.XXXX</b>			
<b>Hollow shaft</b>	Type	a	b	c	d	e	f
<b>a Flange</b>	1 = with spring element, short 5 = with stator coupling, ø 65 mm [2.56"]	<b>d Type of connection</b>	1 = axial cable, 2 m [6.56'] PUR 2 = radial cable, 2 m [6.56'] PUR A = axial cable, length > 2 m [6.56'] B = radial cable, length > 2 m [6.56']	<b>f Cable length in dm <sup>1)</sup></b>	0050 = 5 m [16.40'] 0100 = 10 m [32.81'] 0150 = 15 m [49.21']		
<b>b Blind hollow shaft</b> (insertion depth max. 41.5 mm [1.63"])	1 = ø 12 mm [0.47"] 2 = ø 14 mm [0.55"]	<b>e Pulse rate</b>	1, 5, 10, 12, 36, 50, 100, 200, 250, 256, 300, 360, 400, 500, 512, 600, 800, 1000, 1024, 1200, 2000, 2048, 2500, 3600, 4096, 5000 (e.g. 100 pulses => 0100)	<b>Optional on request</b>	- other pulse rates - special cable length - seawater resistant (stainless steel V4A)		
<b>c Output circuit / supply voltage</b>	4 = RS422 (with inverted signal) / 5 V DC 1 = RS422 (with inverted signal) / 5 ... 30 V DC 2 = push-pull (7272 compatible with inverted signal) / 5 ... 30 V DC 5 = push-pull (with inverted signal) / 10 ... 30 V DC						

<b>Mounting accessory for shaft encoders</b>	Order no.
<b>Coupling</b>	bellows coupling ø 19 mm [0.75"] for shaft 10 mm [0.39"]
	<b>8.0000.1102.1010</b>

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)

Technical data	
Explosion protection	
<b>ATEX</b>	
<b>EU type-examination certificate</b>	IBExU 15 ATEX 1091 X
<b>Category (gas)</b>	
Sendix 7000 – 6000 rpm	Ex II 2G Ex db IIC T4 Gb
Sendix 7000 – 2000 rpm	Ex II 2G Ex db IIC T5 Gb
Sendix 7020 – 3000 rpm	Ex II 2G Ex db IIC T4 Gb
Sendix 7020 – 2000 rpm	Ex II 2G Ex db IIC 120°C (T4) Gb
<b>Category (dust)</b>	
Sendix 7000 – 6000 rpm	Ex II 2D Ex tb IIIC T135°C Db
Sendix 7000 – 2000 rpm	Ex II 2D Ex tb IIIC T100°C Db
Sendix 7020 – 3000 rpm	Ex II 2D Ex tb IIIC T135°C Db
Sendix 7020 – 2000 rpm	Ex II 2D Ex tb IIIC T120°C Db
<b>Relevant standards</b>	
ATEX guideline 2014/34/EU	EN 60079-0:2018 EN 60079-1:2014 EN 60079-31:2014
<b>IECEX</b>	
<b>Certificate of Conformity (CoC)</b>	IECEX IBE 15.0020 X
<b>Category (gas)</b>	
Sendix 7000 – 6000 rpm	Ex db IIC T4 Gb
Sendix 7000 – 2000 rpm	Ex db IIC T5 Gb
Sendix 7020 – 3000 rpm	Ex db IIC T4 Gb
Sendix 7020 – 2000 rpm	Ex db IIC 120°C (T4) Gb
<b>Category (dust)</b>	
Sendix 7000 – 6000 rpm	Ex tb IIIC T135°C Db
Sendix 7000 – 2000 rpm	Ex tb IIIC T100°C Db
Sendix 7020 – 3000 rpm	Ex tb IIIC T135°C Db
Sendix 7020 – 2000 rpm	Ex tb IIIC T120°C Db
<b>Relevant standards</b>	
	IEC 60079-0:2017 IEC 60079-1:2014 IEC 60079-31:2013
Mechanical characteristics	
<b>Maximum speed</b>	shaft 6000 min <sup>-1</sup> (continuous) hollow shaft 3000 min <sup>-1</sup> (continuous)
<b>Starting torque – at 20 °C [68 °F]</b>	< 0.05 Nm
<b>Mass moment of inertia</b>	4.0 x 10 <sup>-6</sup> kgm <sup>2</sup>
<b>Load capacity of shaft</b>	radial 80 N axial 40 N
<b>Weight</b>	approx. 1.5 kg [52.91 oz]
<b>Protection acc. to EN 60529</b>	IP67
<b>Ambient temperature</b>	-40 °C ... +60 °C [-40 °C ... +140 °F] Please note the specifications for temperature class in EU type-examination certificate!
<b>Materials</b>	shaft stainless steel flange / housing seawater durable Al, type AlSiMgMn (EN AW-6082) cable PUR
<b>Shock resistance</b>	acc. to EN/IEC 60068-2-27 2500 m/s <sup>2</sup> , 6 ms
<b>Vibration resistance</b>	acc. to EN/IEC 60068-2-6 100 m/s <sup>2</sup> , 55 ... 2000 Hz

1) Not applicable with connection types 1 and 2.

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Electrical characteristics					
Output circuit	RS422 (TTL compatible)	RS422 (TTL compatible)	Push-pull	Push-pull (7272 compatible)	
	Order code <b>1</b>	<b>4</b>	<b>5</b>	<b>2</b>	
<b>Supply voltage</b>	5 ... 30 V DC	5 V DC (±5 %)	10 ... 30 V DC	5 ... 30 V DC	
<b>Power consumption (no load)</b>	typ. 40 mA max. 90 mA	typ. 40 mA max. 90 mA	typ. 50 mA max. 100 mA	typ. 50 mA max. 100 mA	
<b>Permissible load / channel</b>	max. +/- 20 mA	max. +/- 20 mA	max. +/- 20 mA	max. +/- 20 mA	
<b>Pulse frequency</b>	max. 300 kHz	max. 300 kHz	max. 300 kHz	max. 300 kHz <sup>1)</sup>	
<b>Signal level</b>	HIGH min. 2.5 V LOW max. 0.5 V	min. 2.5 V max. 0.5 V	min +V - 1.0 V max. 0.5 V	min. +V - 2.0 V max. 0.5 V	
<b>Rising edge time <math>t_r</math></b>	max. 200 ns	max. 200 ns	max. 1 µs	max. 1 µs	
<b>Falling edge time <math>t_f</math></b>	max. 200 ns	max. 200 ns	max. 1 µs	max. 1 µs	
<b>Short circuit proof outputs<sup>2)</sup></b>	yes <sup>3)</sup>	yes <sup>3)</sup>	yes	yes	
<b>Reverse polarity protection of the supply voltage</b>	yes	no	yes	no	

EMC	
<b>Relevant standards</b>	EN 55011 class B EN (IEC) 61326-1

Approvals	
<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)

## Terminal assignment

Output circuit	Type of connection	Cable (isolate unused cores individually before initial start-up)											
1, 2, 4, 5	1, 2, A, B	Signal:	0 V	+V	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	0 V <sub>sens</sub>	+V <sub>sens</sub>	$\perp$
		Core marking:	1	2	3	4	5	6	7	8	9	10	shield

- +V: Supply voltage encoder +V DC
- 0 V: Supply voltage encoder ground GND (0 V)
- 0 V<sub>sens</sub> / +V<sub>sens</sub>: Using the sensor outputs of the encoder, the voltage present can be measured and if necessary increased accordingly.
- 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)

1) Max. recommended cable length 30 m [98.43'].  
 2) Short-circuit with 0 V or output, only one channel at a time, supply voltage correctly applied.

3) Only one channel allowed to be shorted-out:  
 at +V= 5 V DC, short-circuit to channel, 0 V, or +V is permitted.  
 at +V= 5 ... 30 V DC, short-circuit to channel or 0 V is permitted.

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**Standard, ATEX/IECEX – zone 1/21  
optical**

**Sendix 7000 / 7020 (shaft / hollow shaft)**

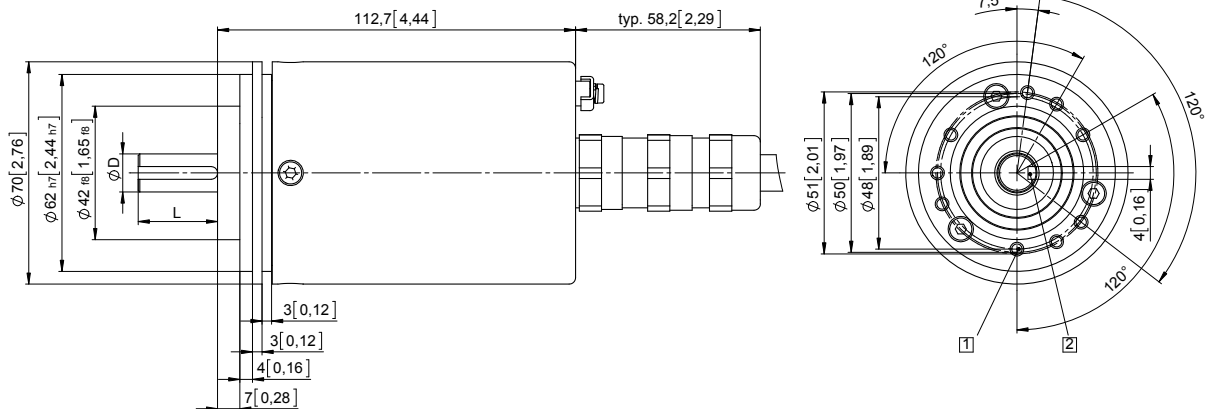
**Push-pull / RS422**

## Dimensions shaft version

Dimensions in mm [inch]

**Clamping / synchronous flange,  $\varnothing$  70 [2.76]  
Shaft type 1 with axial cable outlet**

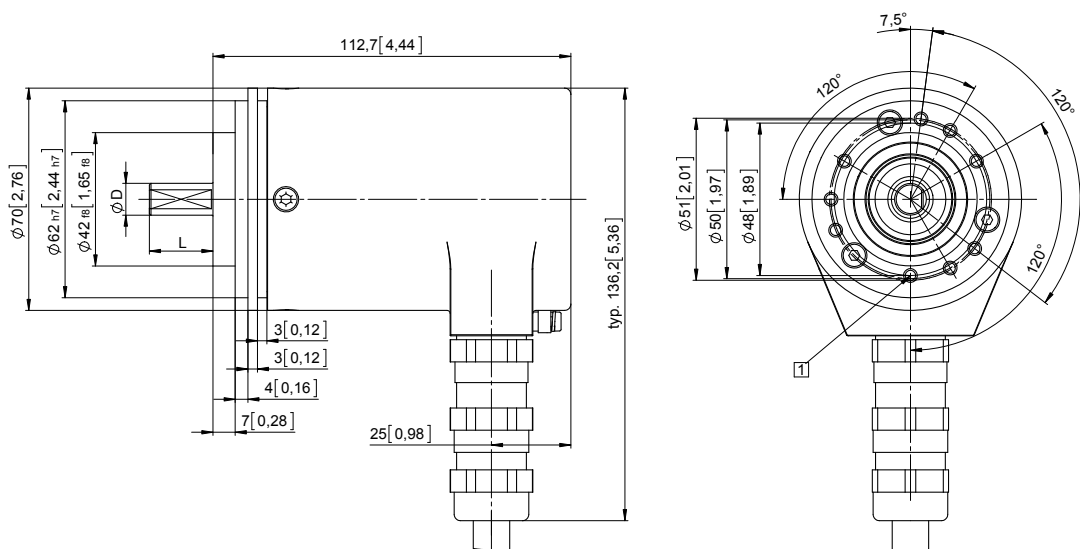
- 1 9 x M4, 10 [0.39] deep
- 2 Keyway for DIN 6885-A-4x4x25 key



D	Fit	L
12 [0.47]	g6	25 [0.98]

**Clamping / synchronous flange,  $\varnothing$  70 [2.76]  
Shaft type 2 with radial cable outlet**

- 1 9 x M4, 10 [0.39] deep



D	Fit	L
10 [0.39]	f7	20 [0.79]

# Incremental encoders

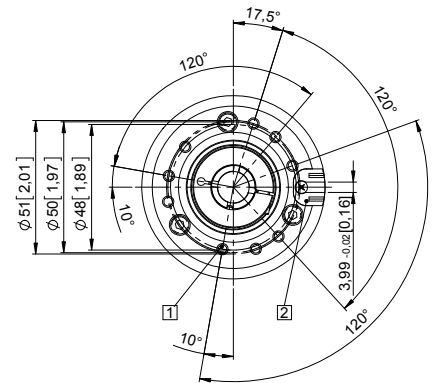
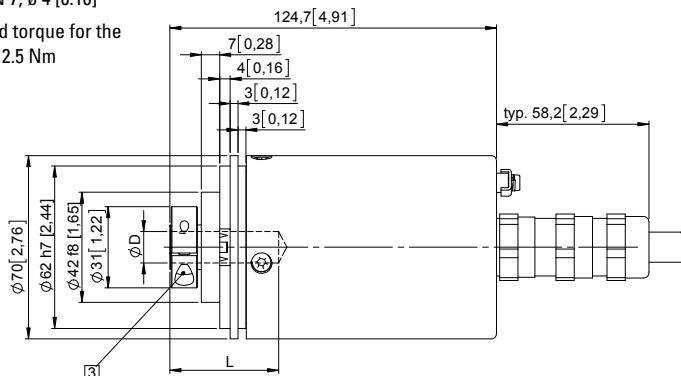
<b>Standard, ATEX/IECEx – zone 1/21 optical</b>	<b>Sendix 7000 / 7020 (shaft / hollow shaft)</b>	<b>Push-pull / RS422</b>
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## Dimensions hollow shaft version

Dimensions in mm [inch]

### Flange with spring element, short Flange type 1

- 1 9 x M4, 10 [0.39] deep
- 2 Slot spring element, recommendation: torque pin DIN 7,  $\varnothing$  4 [0.16]
- 3 Recommended torque for the clamping ring 2.5 Nm

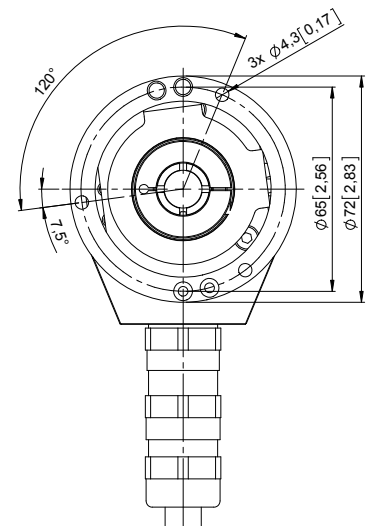
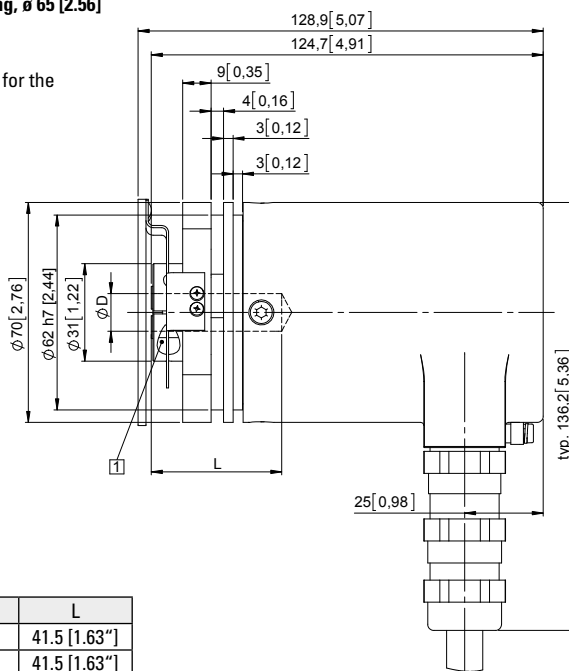


D	Fit	L
12 [0.47]	H7	41.5 [1.63"]
14 [0.55]	H7	41.5 [1.63"]

L = insertion depth max. blind hollow shaft

### Flange with stator coupling, $\varnothing$ 65 [2.56] Flange type 5

- 1 Recommended torque for the clamping ring 2.5 Nm



D	Fit	L
12 [0.47]	H7	41.5 [1.63"]
14 [0.55]	H7	41.5 [1.63"]

L = insertion depth max. blind hollow shaft