

# Incremental encoders

<b>Standard, ATEX/IECEX – mining optical</b>	<b>Sendix 7100 / 7120 (shaft / hollow shaft)</b>	<b>Push-pull / RS422</b>
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The incremental encoders **Sendix 7100 / 7120** in a compact 70 mm stainless steel housing have an **ATEX/IECEX mining approval**.  
 These shock and vibration resistant encoders operate flexibly with a resolution of up to **5000 pulses per revolution**; 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

### Compact and safe

- Can be used even when space is tight.
- Minimal installation depth, diameter 70 mm.
- Compact cable outlet axial or radial.
- Remains sealed even in harsh everyday use and ensures highest safety against field breakdowns (IP67 protection).

### Explosion protection

- Mining approval.
- “Flame-proof enclosure” construction.
- ATEX with EC type examination certificate.
- IECEx with certificate of conformity (CoC).

<b>Order code</b>	<b>8.7100</b>	<b>. 2</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			
<b>a</b> Flange	2 = clamping / synchronous flange, IP67, ø 70 mm [2.76"]	<b>b</b> Shaft (ø x L)	2 = 10 x 20 mm [0.39 x 0.79"], with flat	1 = 12 x 25 mm [0.47 x 0.98"], with keyway for 4 x 4 mm [0.16 x 0.16"] key	<b>c</b> Output circuit / supply voltage	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>d</b> Type of connection	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>e</b> Pulse rate	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>f</b> Cable length in dm <sup>1)</sup>	0050 = 5 m [16.40']	0100 = 10 m [32.81']	0150 = 15 m [49.21']
							<i>Optional on request</i>	- other pulse rates		- special cable length

1) Not applicable with connection types 1 and 2.

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<b>Order code</b> <b>Hollow shaft</b>	<b>8.7120</b> Type	<b>.XXXXX</b> a b c d	<b>.XXXX</b> e	<b>.XXXX</b> f	
<b>a Flange</b> 2 = with spring element, short 6 = with stator coupling, ø 65 mm [2.56"]	<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>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>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>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, 5 (e.g. 100 pulses => 0100)	<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']  <i>Optional on request</i> - other pulse rates - special cable length

## Technical data

Explosion protection 7100	
<b>ATEX</b>	
<b>EC type-examination certificate</b>	IBExU 14 ATEX 1047 X
<b>Category</b>	⊕ I M2 Ex d I/IIC T4 - T6 Mb
<b>Relevant standards</b>	EN 60079-0:2012; ATEX guideline 94/9/EC EN 60079-1:2007
<b>IECEX</b>	
<b>Certificate of Conformity (CoC)</b>	IECEX IBE 14.0023 X
<b>Category</b>	Ex d I/IIC T4 - T6 Mb
<b>Relevant standards</b>	IEC 60079-0:2011; IEC 60079-1:2007

Explosion protection 7120	
<b>ATEX</b>	
<b>EU type-examination certificate</b>	IBExU 15 ATEX 1057 X
<b>Category</b>	⊕ I M2 Ex db I/IIC T4/120°C (T4)/T6 Mb
<b>Relevant standards</b>	EN 60079-0:2012 + A11:2013; ATEX guideline 2014/34/EU EN 60079-1:2014
<b>IECEX</b>	
<b>Certificate of Conformity (CoC)</b>	IECEX IBE 15.0019 X
<b>Category</b>	Ex db I/IIC T4/120°C (T4)/T6 Mb
<b>Relevant standards</b>	IEC 60079-0:2011; IEC 60079-1:2014

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. 2.8 kg [98.77 oz]
<b>Protection acc. to EN 60529</b>	IP67
<b>Ambient temperature</b>	-40 °C ... +60 °C [-40 °F ... +140 °F] Please note the specifications for temperature class in EC type-examination certificate!
<b>Materials</b>	shaft stainless steel flange / housing stainless steel cable PUR
<b>Shock resistance</b>	acc. to EN/IEC 60068-2-27 1000 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

EMC	
<b>Relevant standards</b>	EN 55011 class B:2009 / A1:2010 EN 61000-6-2:2005 / AC:2005 EN 61000-6-3:2007 / A1:2011 EN 61326-1:2013

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)
<b>UKCA compliant</b> in accordance with	EMC Regulations S.I. 2016/1091 RoHS Regulations S.I. 2012/3032 UKEX Regulations S.I. 2016/1107 (for Ex 2/22 variants)

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 ( $\pm 5\%$ )	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 $\mu$ s	max. 1 $\mu$ s
<b>Falling edge time <math>t_f</math></b>	max. 200 ns	max. 200 ns	max. 1 $\mu$ s	max. 1 $\mu$ s
<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
<b>CE compliant acc. to</b>	EMC guideline 2014/30/EU RoHS guideline 2011/65/EU			

## Terminal assignment

Output circuit	Type of connection	Cable (isolate unused cores individually before initial start-up)												
		Signal:	0 V	+V	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	0 V <sub>sens</sub>	+V <sub>sens</sub>	$\perp$	
1, 2, 4, 5	1, 2, A, B	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
- B,  $\bar{B}$ : Incremental output channel B
- 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.

# Incremental encoders

**Standard, ATEX/IECEX – mining optical**

**Sendix 7100 / 7120 (shaft / hollow shaft)**

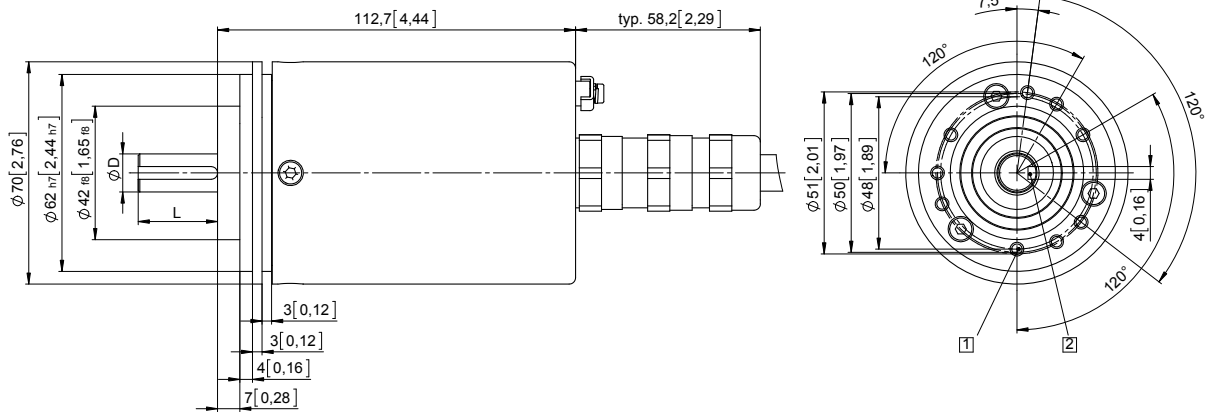
**Push-pull / RS422**

## Dimensions shaft version

Dimensions in mm [inch]

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

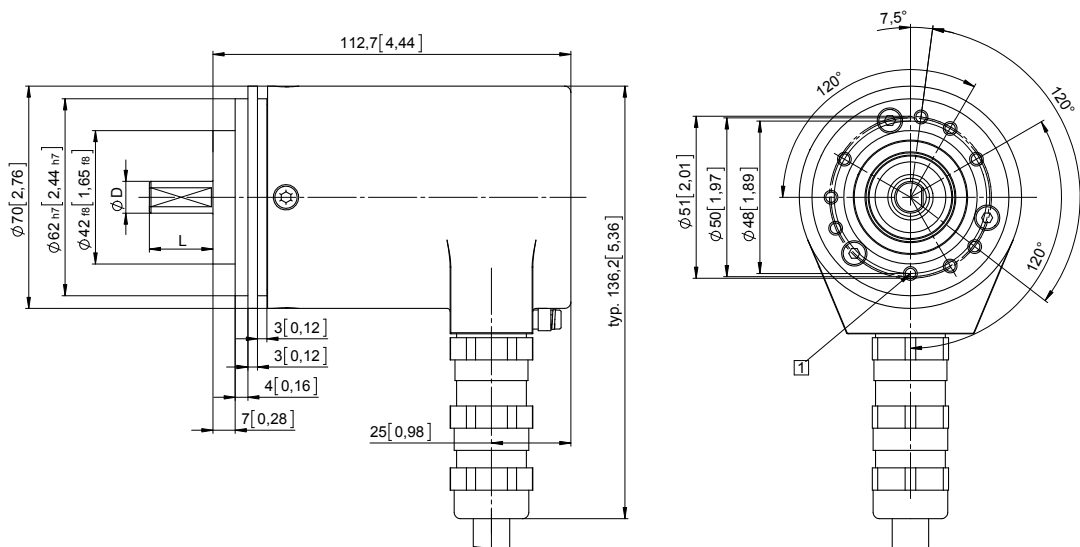
- 1 9 x M4, 10 [0.39] deep
- 2 Keyway for DIN 6885-A-4x4x25 key



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

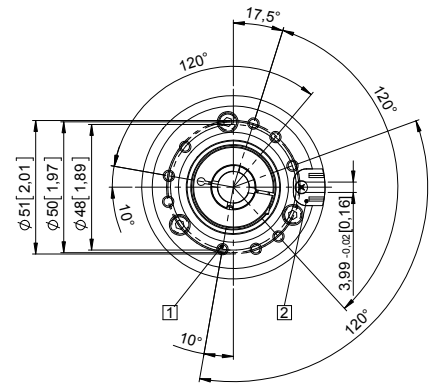
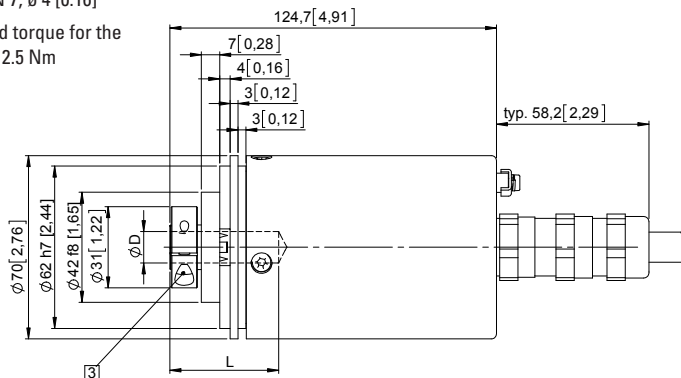
<b>Standard, ATEX/IECEEx – mining optical</b>	<b>Sendix 7100 / 7120 (shaft / hollow shaft)</b>	<b>Push-pull / RS422</b>
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## Dimensions hollow shaft version

Dimensions in mm [inch]

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

- 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



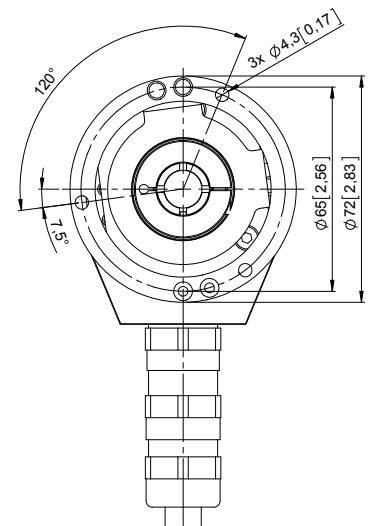
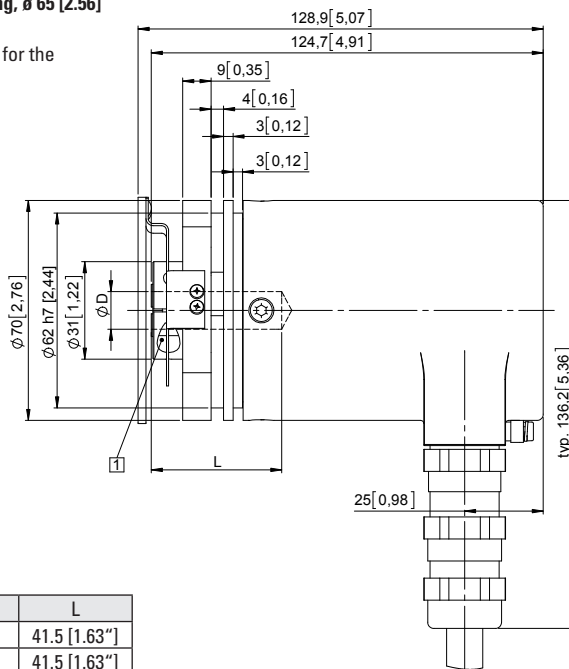
D	Fit	L
12 [0.47]	H7	41.5 [1.63"]
14 [0.55]	H7	41.5 [1.63"]

L = insertion depth max. blind hollow shaft

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

#### Flange type 6

- 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