

# 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.



Incremental encoders

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 . 2 XXXX . XXXX . XXXX</b>
<b>Shaft version</b>	Type    a    b    c    d    e    f

- |   |   |   |
|---|---|---|
| <p><b>a Flange</b><br/>2 = clamping / synchronous flange, IP67, ø 70 mm [2.76"]</p> <p><b>b Shaft (ø x L)</b><br/>2 = 10 x 20 mm [0.39 x 0.79"], with flat<br/>1 = 12 x 25 mm [0.47 x 0.98"],<br/>with keyway for 4 x 4 mm [0.16 x 0.16"] key</p> <p><b>c Output circuit / power supply</b><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 Type of connection</b><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 Pulse rate</b><br/>1, 5, 10, 12, 36, 100, 200, 250, 256,<br/>360, 400, 500, 512, 600, 800, 1000,<br/>1024, 1200, 2000, 2048, 2500, 3600,<br/>4096, 5000<br/>(e.g. 100 pulses =&gt; 0100)</p> | <p><b>f Cable length in dm <sup>1)</sup></b><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</p> |
|---|---|---|

1) Not applicable with connection types 1 and 2.

# Incremental encoders

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

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

**Push-pull / RS422**

**Order code  
Hollow shaft**

**8.7120** . **XXXXX** . **XXXX** . **XXXX**  
Type      **a** **b** **c** **d**      **e**      **f**

**a** Flange

2 = with spring element, short  
6 = with stator coupling, IP67, ø 65 mm [2.56"]

**b** Blind hollow shaft

(insertion depth max. 41.5 mm [1.63"])

1 = ø 12 mm [0.47"]  
2 = ø 14 mm [0.55"]

**c** Output circuit / power supply

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

**d** 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']

**e** Pulse rate

1, 5, 10, 12, 36, 100, 200, 250, 256,  
360, 400, 500, 512, 600, 800, 1000,  
1024, 1200, 2000, 2048, 2500, 3600,  
4096, 5000  
(e.g. 100 pulses => 0100)

**f** Cable length in dm <sup>1)</sup>

0050 = 5 m [16.40']  
0100 = 10 m [32.81']  
0150 = 15 m [49.21']

Optional on request  
- other pulse rates  
- special cable length

## Technical data

### Explosion protection 7100

#### ATEX

**EC type-examination certificate** IBEExU 14 ATEX 1047 X

**Category** I M2 Ex d I/IIC T4 - T6 Mb

**Relevant standards** EN 60079-0:2012;  
EN 60079-1:2007

#### IECEX

**Certificate of Conformity (CoC)** IECEX IBE 14.0023 X

**Category** I M2 Ex d I/IIC T4 - T6 Mb

**Relevant standards** IEC 60079-0:2011;  
IEC 60079-1:2007

### Explosion protection 7120

#### ATEX

**EC type-examination certificate** IBEExU 15 ATEX 1057 X

**Category** I M2 Ex d I/IIC T4 Mb

**Relevant standards** EN 60079-0:2012;  
EN 60079-1:2014

#### IECEX

**Certificate of Conformity (CoC)** IECEX IBE 15.0019 X

**Category** Ex d I/IIC T4 Mb

**Relevant standards** IEC 60079-0:2011;  
IEC 60079-1:2014

### Mechanical characteristics

**Maximum speed** 6000 min<sup>-1</sup> (continuous)

**Starting torque – at 20°C [68°F]** < 0.05 Nm

**Mass moment of inertia** 4.0 x 10<sup>-6</sup> kgm<sup>2</sup>

**Load capacity of shaft** radial 80 N  
axial 40 N

**Weight** approx. 2.8 kg [98.77 oz]

**Protection acc. to EN 60529** IP67

**Ambient temperature** -40°C ... +60°C [-40 ... +140°F]  
Please note the specifications for temperature class in EC type-examination certificate!

**Materials** shaft stainless steel  
flange / housing stainless steel  
cable PUR

**Shock resistance acc. to EN 60068-2-27** 1000 m/s<sup>2</sup>, 6 ms

**Vibration resistance acc. to EN 60068-2-6** 100 m/s<sup>2</sup>, 55 ... 2000 Hz

### EMC

**Relevant standards** 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

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>Power supply</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 power supply</b>	yes	no	yes	no
<b>CE compliant acc. to</b>	EMC guideline 2014/30/EU ATEX guideline 2014/34/EU RoHS guideline 2011/65/EU			

Incremental encoders

## Terminal assignment

Output circuit	Type of connection	Cable (isolate unused wires 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>	$\perp$
		Cable marking:	1	2	3	4	5	6	7	8	9	10	shield

- +V: Encoder power supply +V DC
- 0 V: Encoder power supply 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, power supply 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 – mining optical**

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

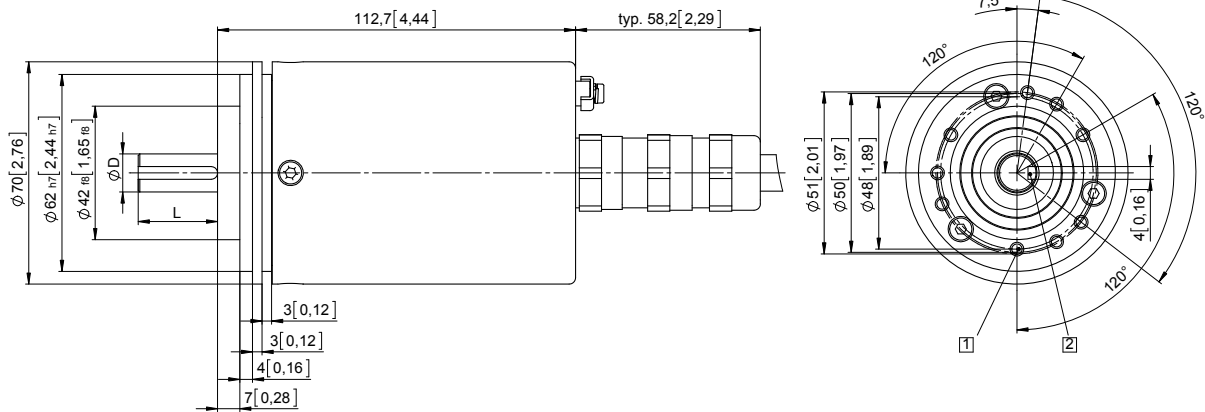
**Push-pull / RS422**

## Dimensions shaft version

Dimensions in mm [inch]

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

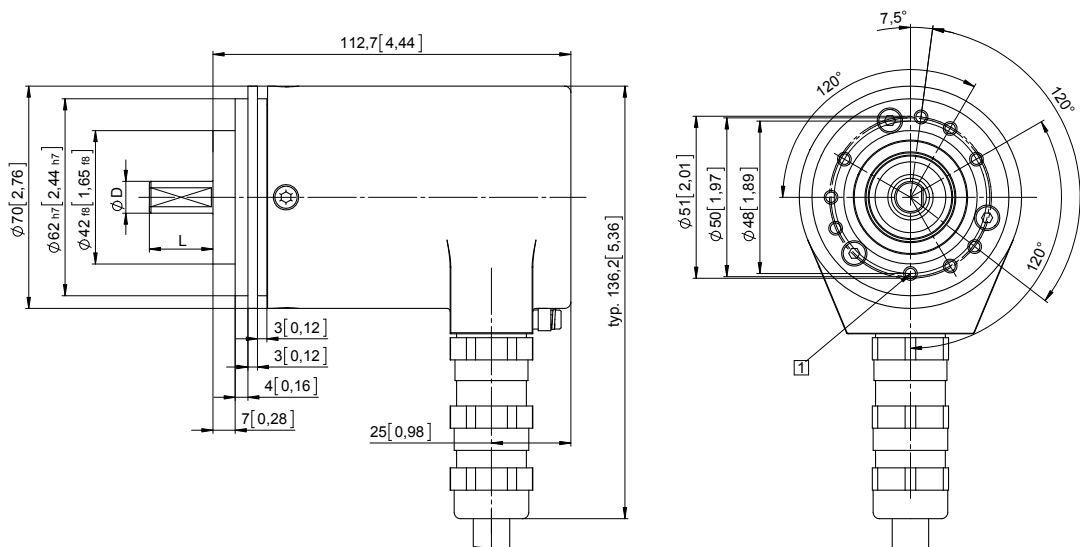
- 1 9 x M4, 10 [0.39] deep
- 2 Keyway for DIN 6885-A-4x4x25 key



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

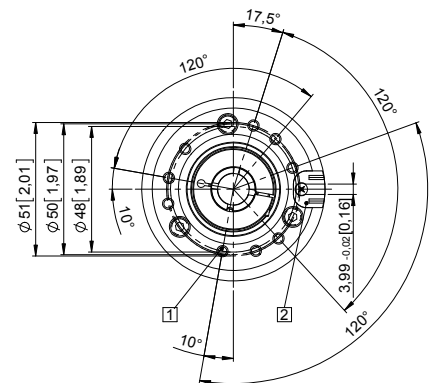
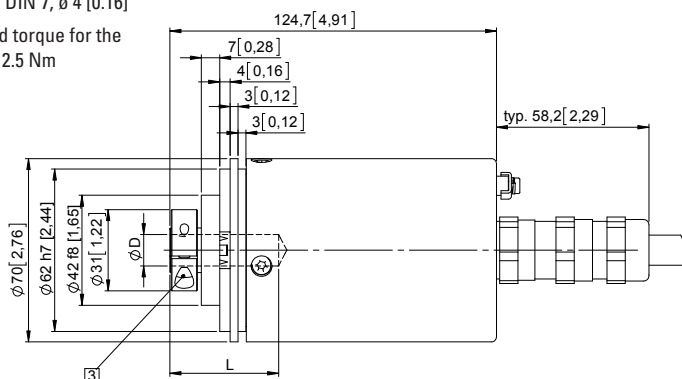
<b>Standard, ATEX/IECEX – mining optical</b>	<b>Sendix 7100 / 7120 (shaft / hollow shaft)</b>	<b>Push-pull / RS422</b>
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## Dimensions hollow shaft version

Dimensions in mm [inch]

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

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



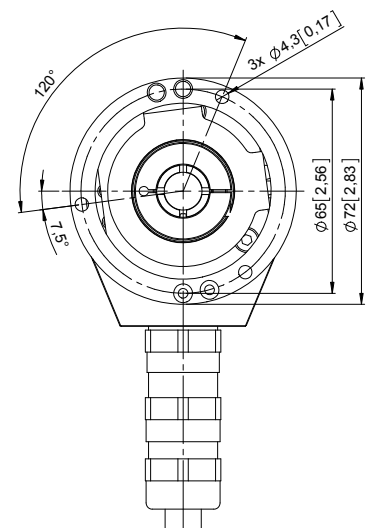
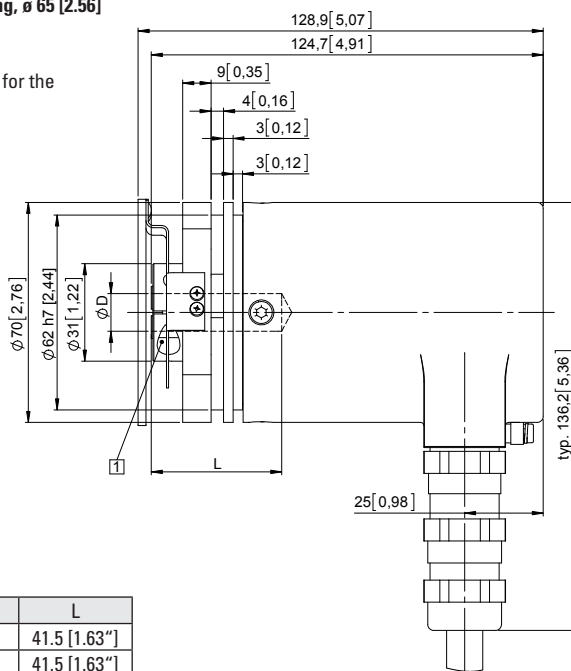
D	Fit	L
12 [0.47]	H7	41.5 [1.63"]
14 [0.55]	H7	41.5 [1.63"]

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