

# Incremental encoders

Standard, ATEX/IECEX – mining optical

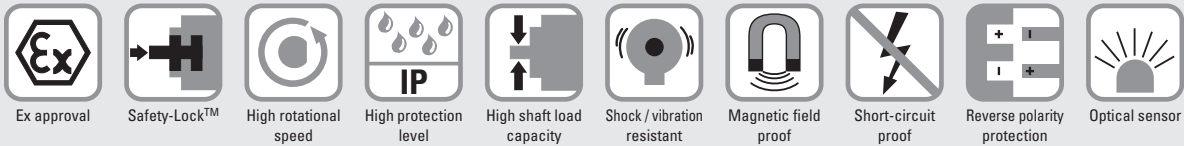
Sendix 7100 / 7120 (shaft / hollow shaft)

Push-pull / RS422



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.



## 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).

## Order code Shaft version

8.7100 . 2 XXXX . XXXX . XXXX  
Type      a b c d      e      f

### a Flange

2 = clamping / synchronous flange, IP67,  $\varnothing$  70 mm [2.76"]

### b Shaft ( $\varnothing \times L$ )

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

### 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, 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)

### 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

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	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">. X X X X .</td> <td style="text-align: center;">. X X X X .</td> <td style="text-align: center;">. X X X 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> </tr> <tr> <td style="text-align: center;">d</td> <td style="text-align: center;">e</td> <td style="text-align: center;">f</td> </tr> </table>	. X X X X .	. X X X X .	. X X X X .	a	b	c	d	e	f	
. X X X X .	. X X X X .	. X X X X .										
a	b	c										
d	e	f										
<b>a Flange</b> 2 = with spring element, short 6 = with stator coupling, IP67, ø 65 mm [2.56"]	<b>b Blind hollow shaft</b> <i>(insertion depth max. 41.5 mm [1.63"])</i> 1 = ø 12 mm [0.47"] 2 = ø 14 mm [0.55"]	<b>c Output circuit / power supply</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 ... +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

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 RoHS guideline 2011/65/EU			

### 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: 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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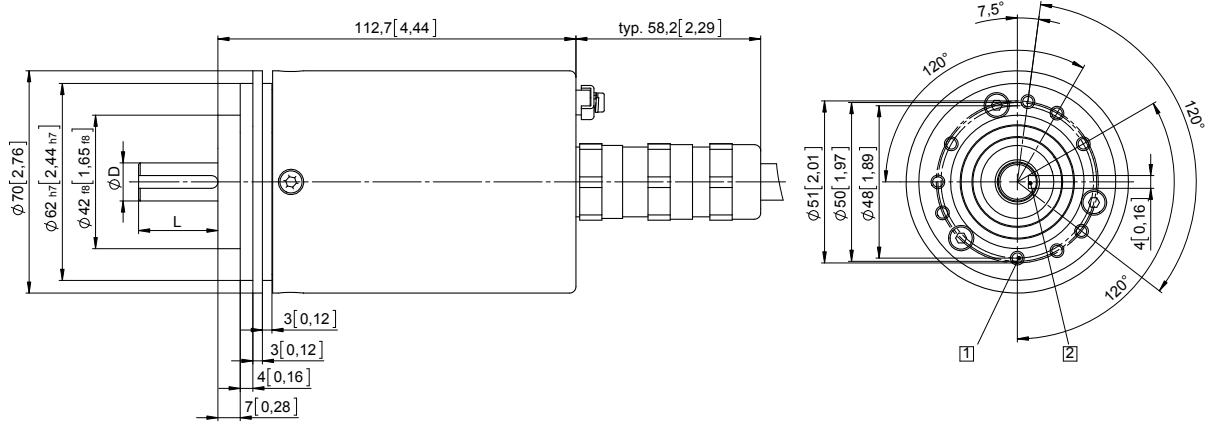
## Dimensions shaft version

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

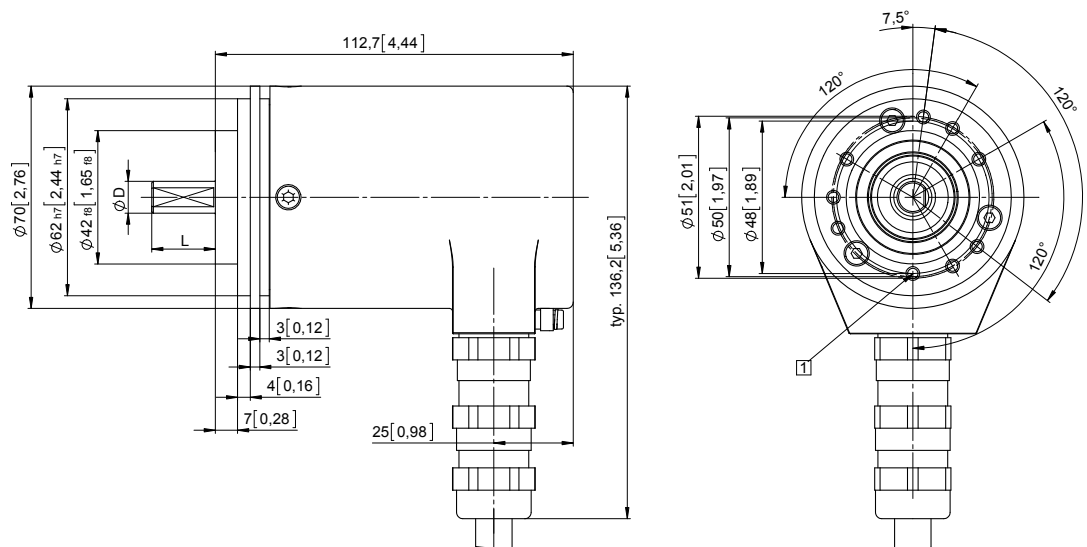


D	Fit	L
12 [0.47]	g6	25 [0.98]

### 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]

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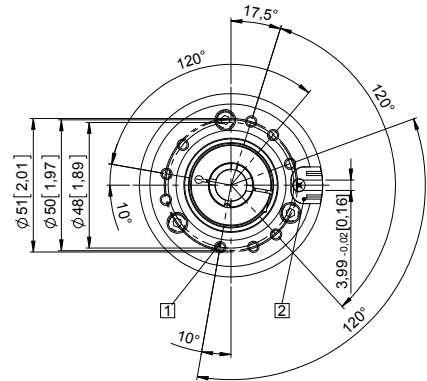
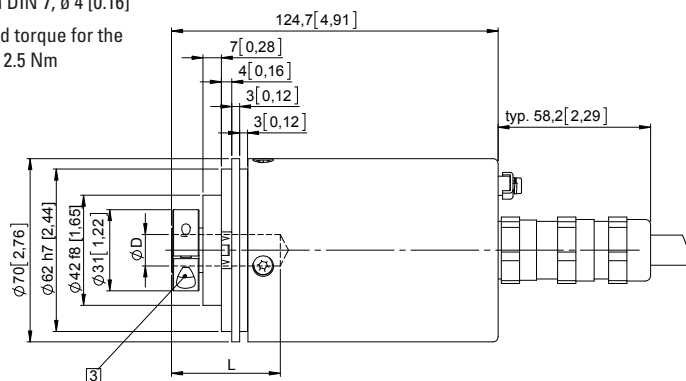
**Push-pull / RS422**

## 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: cylindrical pin DIN 7,  $\varnothing$  4 [0.16]
- 3 Recommended torque for the clamping ring 2.5 Nm



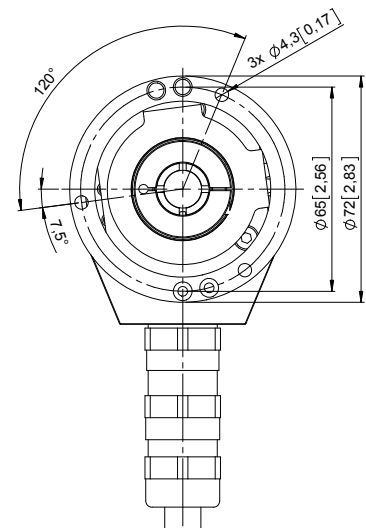
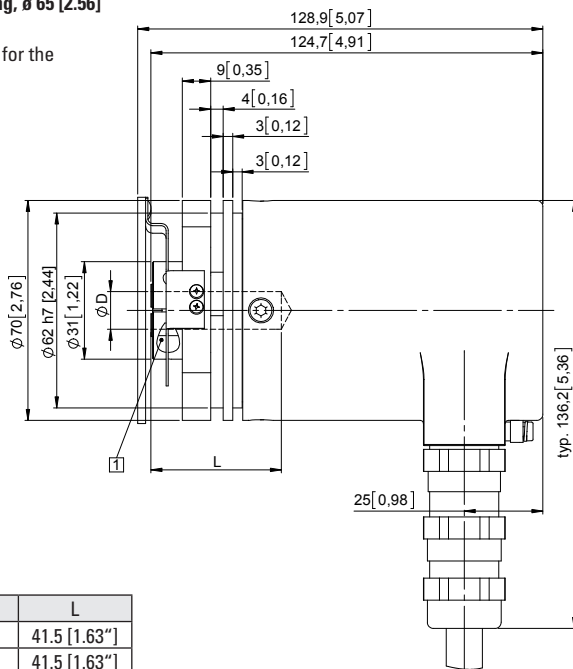
D	Fit	L
12 [0.47]	H7	41.5 [1.63"]
14 [0.55]	H7	41.5 [1.63"]

L = insertion depth max. blind hollow shaft

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

#### Flange type 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