

# Absolute encoders – multiturn

Standard, ATEX/IECEX – mining  
mechanical multiturn, optical

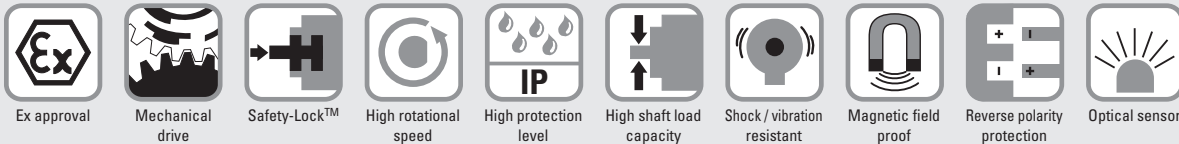
Sendix 7163 / 7183 (shaft / hollow shaft)

SSI / BiSS



The Sendix 7163 / 7183 absolute multiturn encoders in a compact 70 mm stainless-steel housing, with an SSI or BiSS interface and optical sensor technology have an ATEX/IECEX mining approval.

These shock and vibration-resistant encoders operate flexibly with a resolution of up to 29 bits; 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

8.7163 . 2 X 2 X . X X 2 1 . XXXX  
Type      a b c d e f g h i <sup>1)</sup>

### a Flange

2 = clamping / synchronous flange, IP67, ø 70 mm [2.76"]

### 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

### c Interface / power supply

2 = SSI, BiSS / 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 Code

B = SSI, binary  
C = BiSS, binary  
G = SSI, gray

### f Resolution <sup>2)</sup>

A = 10 bit ST + 12 bit MT  
1 = 11 bit ST + 12 bit MT  
2 = 12 bit ST + 12 bit MT  
3 = 13 bit ST + 12 bit MT  
4 = 14 bit ST + 12 bit MT  
7 = 17 bit ST + 12 bit MT

### g Inputs / outputs <sup>2)</sup>

2 = SET, DIR input  
additional status output

### h Options

1 = no option

### i 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  
- special cable length  
- other singleturn resolutions

1) Not applicable with connection types 1 and 2.

2) Resolution, preset value and counting direction factory-programmable.

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**Standard, ATEX/IECEX – mining mechanical multiturn, optical**      **Sendix 7163 / 7183 (shaft / hollow shaft)**      **SSI/BiSS**

<b>Order code</b>	<b>8.7183</b>	<b>.XX2X.XX21.XXXX</b>
<b>Hollow shaft</b>	Type	a b c d e f g h i <sup>1)</sup>

<p><b>a Flange</b> 2 = with spring element, short 6 = with stator coupling, IP67, ø 65 mm [2.56"]</p> <p><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"]</p> <p><b>c Interface / power supply</b> 2 = SSI, BiSS / 10 ... 30 V DC</p> <p><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 &gt; 2 m [6.56'] B = radial cable, length &gt; 2 m [6.56']</p>	<p><b>e Code</b> B = SSI, binary C = BiSS, binary G = SSI, gray</p> <p><b>f Resolution <sup>2)</sup></b> A = 10 bit ST + 12 bit MT 1 = 11 bit ST + 12 bit MT 2 = 12 bit ST + 12 bit MT 3 = 13 bit ST + 12 bit MT 4 = 14 bit ST + 12 bit MT 7 = 17 bit ST + 12 bit MT</p>	<p><b>g Inputs / outputs <sup>2)</sup></b> 2 = SET, DIR input additional status output</p> <p><b>h Options</b> 1 = no option</p> <p><b>i Cable length in dm <sup>1)</sup></b> 0050 = 5 m [16.40'] 0100 = 10 m [32.81'] 0150 = 15 m [49.21']</p> <p><i>Optional on request</i> - special cable length - other singleturn resolutions</p>
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## Technical data

Explosion protection 7163	
<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; 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; ATEX guideline 94/9/EC IEC 60079-1:2007

Explosion protection 7183	
<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

Electrical characteristics	
<b>Power supply</b>	10 ... 30 V DC
<b>Current consumption (no load)</b>	max. 45 mA
<b>Reverse polarity protection for power supply</b>	yes
<b>Short-circuit proof outputs</b>	yes <sup>3)</sup>
<b>CE compliant acc. to</b>	EMC guideline 2014/30/EU RoHS guideline 2011/65/EU

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  
2) Resolution, preset value and counting direction factory-programmable.  
3) Short-circuit with 0 V or output, only one channel at a time, power supply correctly applied.

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SSI interface	
<b>Output driver</b>	RS485 transceiver type
<b>Permissible load / channel</b>	max. +/- 20 mA
<b>Signal level</b>	HIGH typ 3.8 V LOW at I <sub>Load</sub> = 20 mA typ 1.3 V
<b>Resolution singleturn</b>	10 ... 14 bit and 17 bit
<b>Number of revolutions (multiturn)</b>	4096 (12 bit)
<b>Code</b>	binary or gray
<b>SSI clock rate</b>	50 kHz ... 2 MHz
<b>Data refresh rate</b>	ST resolution ≤ 14 bit ≤ 1 μs ST resolution ≥ 15 bit 4 μs
<b>Monoflop time</b>	≤ 15 μs
<b>Note:</b> if clock starts cycling within monoflop time a second data transfer starts with the same data. If clock starts cycling after monoflop time, the data transfer starts with updated values. The update rate depends on clock speed, data length and monoflop time.	

BiSS interface	
<b>Output driver</b>	RS485 transceiver type
<b>Permissible load / channel</b>	max. +/- 20 mA
<b>Signal level</b>	HIGH typ 3.8 V LOW at I <sub>Load</sub> = 20 mA typ 1.3 V
<b>Resolution singleturn</b>	10 ... 14 bit and 17 bit
<b>Number of revolutions (multiturn)</b>	4096 (12 bit)
<b>Code</b>	binary
<b>Clock rate</b>	up to 10 MHz
<b>Max. update rate</b>	< 10 μs, depends on the clock rate and the data length
<b>Data refresh rate</b>	ST resolution ≤ 14 bit ≤ 1 μs ST resolution 17 bit 2.4 μs
<b>Note:</b> – bidirectional, factory programmable parameters are: resolution, code, direction, alarms and warnings – CRC data verification	

Status output	
<b>Output driver</b>	open collector, internal pull-up resistor 22 kΩ
<b>Permissible load</b>	max. 20 mA
<b>Signal level</b>	HIGH +V LOW < 1 V
<b>Active at</b>	LOW
The status output serves to display various alarm or error messages. The status output is HIGH (open collector with internal pull-up 22 kΩ) in normal operation.	

## Terminal assignment

Interface	Type of connection	Features	Cable (isolate unused cores individually before initial start-up)												
			Signal:	0 V	+V	C+	C-	D+	D-	SET	DIR	Stat	⊥	⊥	
2	1, 2, A, B	SET, DIR	Core marking:	1	2	3	4	5	6	7	8	9	YE/GN	shield	

+V: Encoder power supply +V DC  
 0 V: Encoder power supply ground GND (0 V)  
 C+, C-: Clock signal  
 D+, D-: Data signal  
 SET: Set input

DIR: Direction input  
 Stat: Status output  
 ⊥: Protective earth

SET input	
<b>Input</b>	HIGH active
<b>Input type</b>	comparator
<b>Signal level</b> (+V = Power supply)	HIGH min. 60 % of +V max. +V LOW max. 25 % of +V
<b>Input current</b>	< 0.5 mA
<b>Min. pulse duration (SET)</b>	10 ms
<b>Timeout after SET signal</b>	14 ms
The encoder can be set to zero at any position by means of a HIGH signal on the SET input. Other preset values can be factory-programmed. The SET input has a signal delay time of approximately 1 ms. Once the SET function has been triggered, the encoder requires an internal processing time of approximately 15 ms before the new position data can be read. If this input is not used, it should be connected to 0 V (Encoder ground GND) in order to avoid interferences.	

DIR input	
Direction input: A HIGH signal switches the direction of rotation from the default cw to ccw. This inverted function can also be factory-programmed. If DIR is reversed when the device is already switched on, this will be interpreted as an error. The status output switches to LOW. If this input is not used, it should be connected to 0 V (Encoder ground GND) in order to avoid interferences.	
<b>Response time (DIR input)</b>	1 ms

Power-ON	
After Power-ON the device requires a time of approx. 150 ms before valid data can be read. Hot plugging of the encoder should be avoided.	

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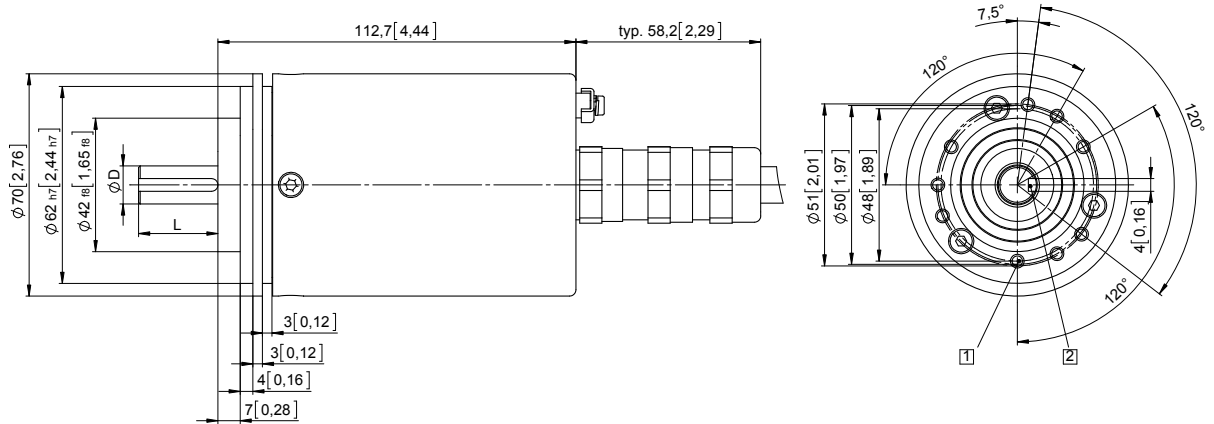
**Standard, ATEX/IECEX – mining mechanical multiturn, optical**      **Sendix 7163 / 7183 (shaft / hollow shaft)**      **SSI/BiSS**

## Dimensions shaft version

Dimensions in mm [inch]

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

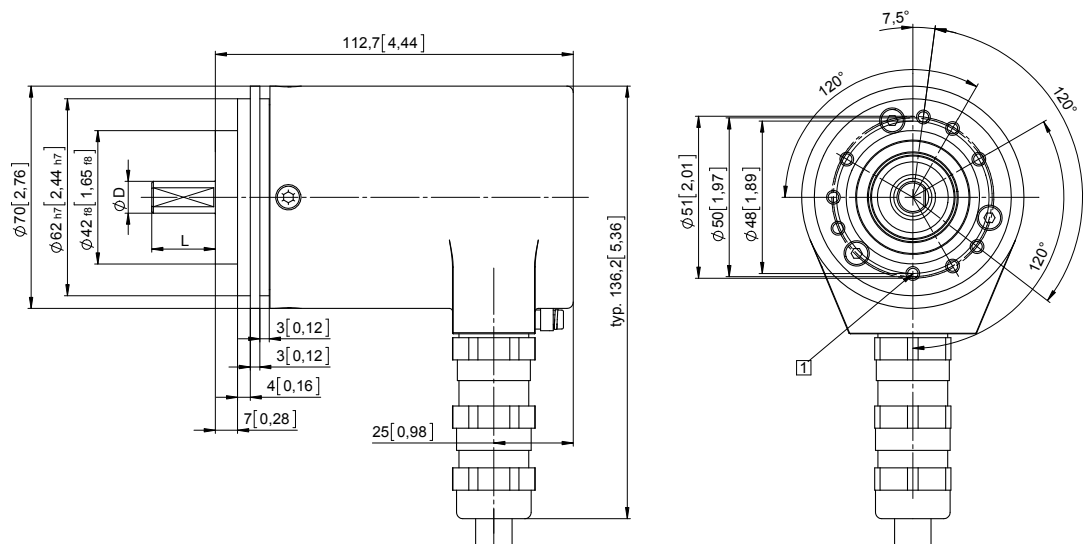
- 1 9 x M4, 10 [0.39] deep
- 2 Keyway for DIN 6885-A-4x4x25 key



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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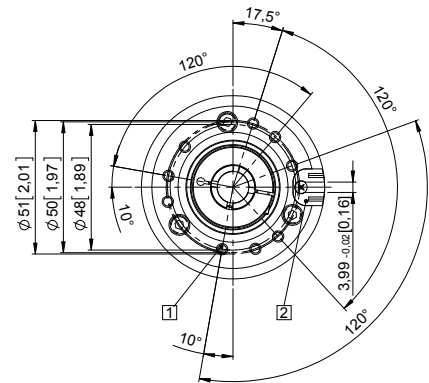
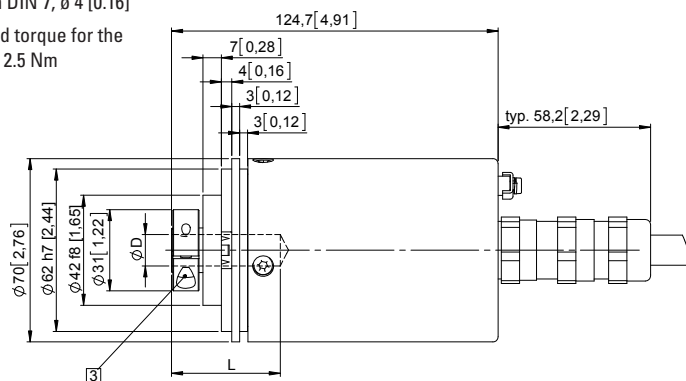
**SSI/BiSS**

## 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



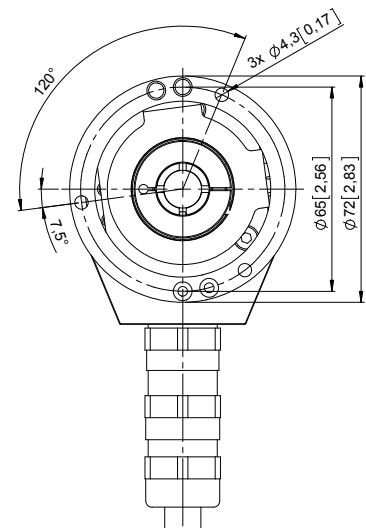
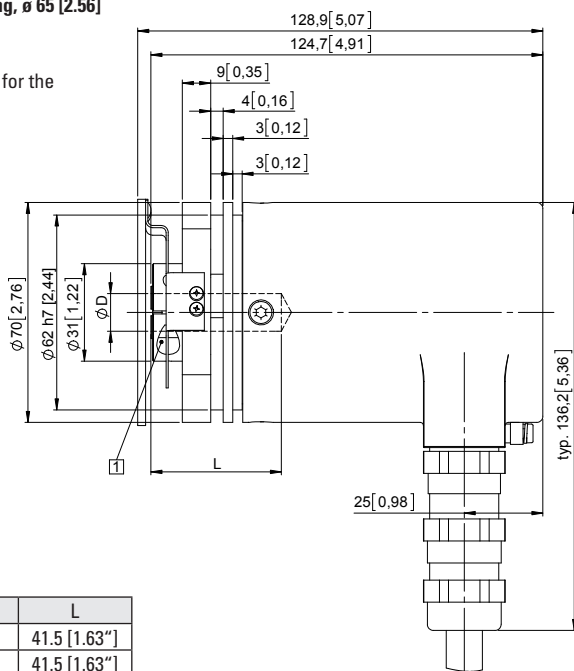
D	Fit	L
12 [0.47]	H7	41.5 [1.63"]
14 [0.55]	H7	41.5 [1.63"]

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