

Absolute encoders - singleturn

Standard, ATEX/IECEX – mining optical	Sendix 7153 / 7173 (shaft / hollow shaft)	SSI / BiSS
---------------------------------------	-------------------------------------------	------------



The Sendix 7153 / 7173 absolute singleturn 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 17 bits; 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).

Order code 8.7153 . 2 X 2 X . X X 2 1 . XXXX
Shaft version Type a b c d e f g h i ¹⁾

- | | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>a Flange
2 = clamping / synchronous flange, ø 70 mm [2.76"]</p> <p>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</p> <p>c Interface / supply voltage
2 = SSI, BiSS / 10 ... 30 V DC</p> <p>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']</p> | <p>e Code
B = SSI, binary
C = BiSS, binary
G = SSI, gray</p> <p>f Resolution ²⁾
A = 10 bit
1 = 11 bit
2 = 12 bit
3 = 13 bit
4 = 14 bit
7 = 17 bit</p> | <p>g Inputs / outputs ²⁾
2 = SET, DIR input
additional status output</p> <p>h Options
1 = no option</p> <p>i Cable length in dm ¹⁾
0050 = 5 m [16.40']
0100 = 10 m [32.81']
0150 = 15 m [49.21']</p> <p style="text-align: right;"><i>Optional on request</i>
- special cable length
- other resolutions</p> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

1) Not applicable with connection types 1 and 2
 2) Resolution, preset value and counting direction factory-programmable.

Absolute encoders - singleturn

Standard, ATEX/IECEX – mining optical	Sendix 7153 / 7173 (shaft / hollow shaft)	SSI / BiSS
----------------------------------------------	--------------------------------------------------	-------------------

Order code Hollow shaft	8.7173 Type	<table style="font-size: 0.8em; border-collapse: collapse;"> <tr> <td style="border: 1px solid black; padding: 2px;">X</td> <td style="border: 1px solid black; padding: 2px;">X</td> <td style="border: 1px solid black; padding: 2px;">2</td> <td style="border: 1px solid black; padding: 2px;">X</td> <td style="border: 1px solid black; padding: 2px;">.</td> <td style="border: 1px solid black; padding: 2px;">X</td> <td style="border: 1px solid black; padding: 2px;">X</td> <td style="border: 1px solid black; padding: 2px;">2</td> <td style="border: 1px solid black; padding: 2px;">1</td> <td style="border: 1px solid black; padding: 2px;">.</td> <td style="border: 1px solid black; padding: 2px;">X</td> <td style="border: 1px solid black; padding: 2px;">X</td> <td style="border: 1px solid black; padding: 2px;">X</td> <td style="border: 1px solid black; padding: 2px;">X</td> </tr> <tr> <td style="font-size: 0.7em; text-align: center;">a</td> <td style="font-size: 0.7em; text-align: center;">b</td> <td style="font-size: 0.7em; text-align: center;">c</td> <td style="font-size: 0.7em; text-align: center;">d</td> <td></td> <td style="font-size: 0.7em; text-align: center;">e</td> <td style="font-size: 0.7em; text-align: center;">f</td> <td style="font-size: 0.7em; text-align: center;">g</td> <td style="font-size: 0.7em; text-align: center;">h</td> <td></td> <td style="font-size: 0.7em; text-align: center;">i</td> <td colspan="3"></td> </tr> </table>	X	X	2	X	.	X	X	2	1	.	X	X	X	X	a	b	c	d		e	f	g	h		i				
X	X	2	X	.	X	X	2	1	.	X	X	X	X																		
a	b	c	d		e	f	g	h		i																					
a Flange 2 = with spring element, short 6 = with stator coupling, ø 65 mm [2.56"]	e Code B = SSI, binary C = BiSS, binary G = SSI, gray	g Inputs / outputs²⁾ 2 = SET, DIR input additional status output																													
b Blind hollow shaft <i>(insertion depth max. 41.5 mm [1.63"])</i> 1 = ø 12 mm [0.47"] 2 = ø 14 mm [0.55"]	f Resolution²⁾ A = 10 bit 1 = 11 bit 2 = 12 bit 3 = 13 bit 4 = 14 bit 7 = 17 bit	h Options 1 = no option																													
c Interface / supply voltage 2 = SSI, BiSS / 10 ... 30 V DC		i Cable length in dm¹⁾ 0050 = 5 m [16.40'] 0100 = 10 m [32.81'] 0150 = 15 m [49.21']																													
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']		<i>Optional on request</i> - special cable length - other resolutions																													

Technical data

Explosion protection 7153	
ATEX	
EC type-examination certificate	IBExU 14 ATEX 1047 X
Category	⊕ I M2 Ex d I/IIC T4 - T6 Mb
Relevant standards	EN 60079-0:2012; ATEX guideline 94/9/EC EN 60079-1:2007
IECEX	
Certificate of Conformity (CoC)	IECEX IBE 14.0023 X
Category	Ex d I/IIC T4 - T6 Mb
Relevant standards	IEC 60079-0:2011; ATEX guideline 94/9/EC IEC 60079-1:2007

Explosion protection 7173	
ATEX	
EU type-examination certificate	IBExU 15 ATEX 1057 X
Category	⊕ I M2 Ex db I/IIC T4/120°C (T4)/T6 Mb
Relevant standards	EN 60079-0:2012 + A11:2013; ATEX guideline 2014/34/EU EN 60079-1:2014
IECEX	
Certificate of Conformity (CoC)	IECEX IBE 15.0019 X
Category	Ex db I/IIC T4/120°C (T4)/T6 Mb
Relevant standards	IEC 60079-0:2011; IEC 60079-1:2014

Mechanical characteristics	
Maximum speed	shaft 6000 min ⁻¹ (continuous)
	hollow shaft 3000 min ⁻¹ (continuous)
Starting torque - at 20 °C [68 °F]	< 0.05 Nm
Mass moment of inertia	4.0 x 10 ⁻⁶ kgm ²
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 [-4 °F ... +140 °F] Please note the specifications for temperature class in EC type-examination certificate!
Material	shaft stainless steel
	flange / housing stainless steel
	cable PUR
Shock resistance	
acc. to EN/IEC 60068-2-27	1000 m/s ² , 6 ms
Vibration resistance	
acc. to EN/IEC 60068-2-6	100 m/s ² , 55 ... 2000 Hz

Electrical characteristics	
Supply voltage	10 ... 30 V DC
Current consumption (no load)	max. 45 mA
Reverse polarity protection for supply voltage	yes
Short-circuit proof outputs	yes ³⁾

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

Absolute encoders - singleturn

Standard, ATEX/IECEX – mining optical	Sendix 7153 / 7173 (shaft / hollow shaft)	SSI / BiSS
----------------------------------------------	--------------------------------------------------	-------------------

SSI interface	
Output driver	RS485 transceiver type
Permissible load / channel	max. +/- 20 mA
Signal level	HIGH typ 3.8 V LOW at I _{Load} = 20 mA typ 1.3 V
Resolution	10 ... 14 bit and 17 bit
Code	binary or gray
SSI clock rate	50 kHz ... 2 MHz
Data refresh rate	ST resolution ≤ 14 bit ≤ 1 μs ST resolution ≥ 15 bit 4 μs
Monoflop time	≤ 15 μs
Note: 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	
Output driver	RS485 transceiver type
Permissible load / channel	max. +/- 20 mA
Signal level	HIGH typ 3.8 V LOW at I _{Load} = 20 mA typ 1.3 V
Resolution	10 ... 14 bit and 17 bit
Code	binary
Clock rate	up to 10 MHz
Max. update rate	< 10 μs, depends on the clock rate and the data length
Data refresh rate	ST resolution ≤ 14 bit ≤ 1 μs ST resolution 17 bit 2.4 μs
Note: <ul style="list-style-type: none"> – bidirectional, factory programmable parameters are: resolution, code, direction, alarms and warnings – CRC data verification 	

Status output	
Output driver	open collector, internal pull-up resistor 22 kΩ
Permissible load	max. 20 mA
Signal level	HIGH +V LOW < 1 V
Active at	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: Supply voltage encoder +V DC
- 0 V: Supply voltage encoder 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	
Input	HIGH active
Input type	comparator
Signal level (+V = supply voltage)	HIGH min. 60% of +V max. +V LOW max. 25% of +V
Input current	< 0.5 mA
Min. pulse duration (SET)	10 ms
Timeout after SET signal	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.	
Response time (DIR input)	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.	

Approvals		
CE compliant in accordance with	EMC Directive	2014/30/EU
	RoHS Directive	2011/65/EU
	ATEX Directive	2014/34/EU (for Ex 2/22 variants)

Absolute encoders - singleturn

Standard, ATEX/IECEX – mining optical

Sendix 7153 / 7173 (shaft / hollow shaft)

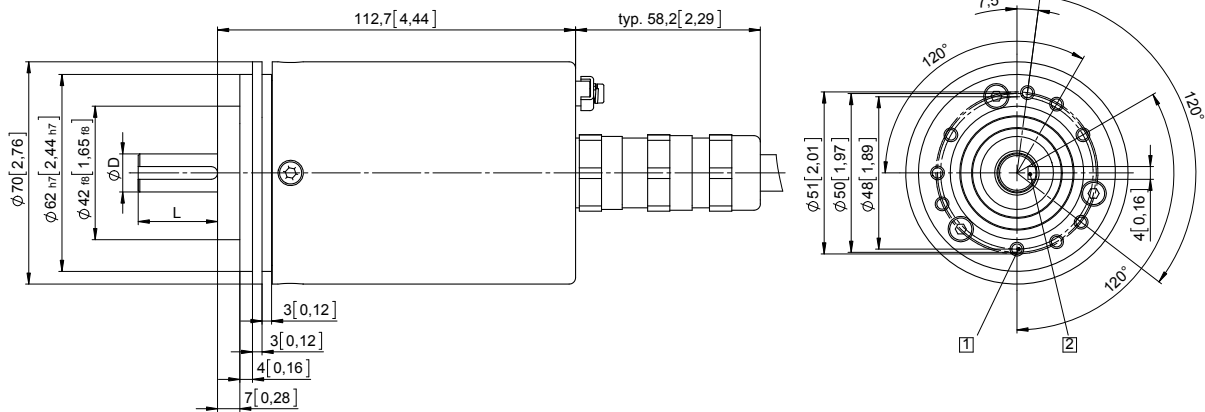
SSI / BiSS

Dimensions shaft version

Dimensions in mm [inch]

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

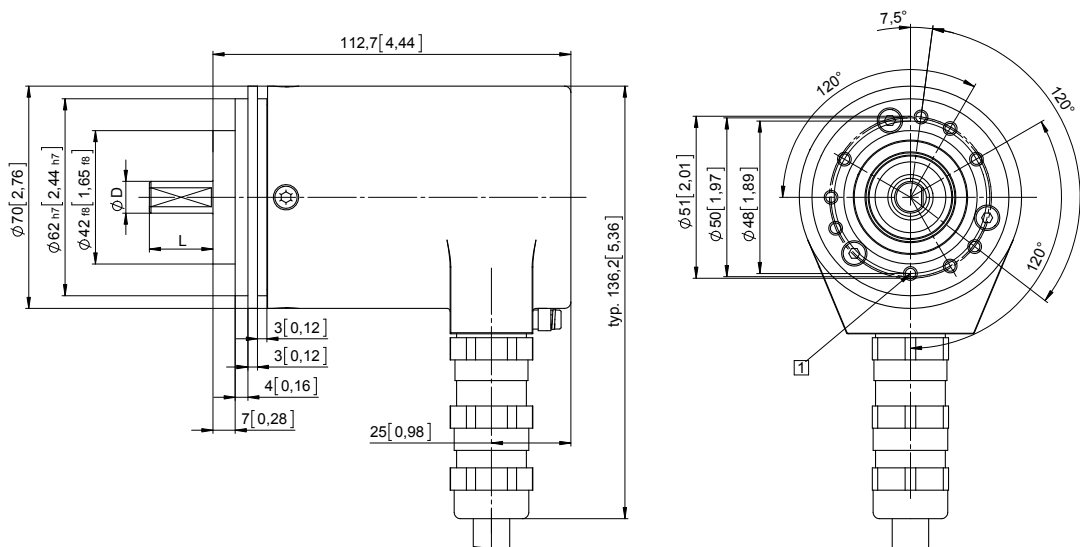
- 1 9 x M4, 10 [0.39] deep
- 2 Keyway for DIN 6885-A-4x4x25 key



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]

Absolute encoders - singleturn

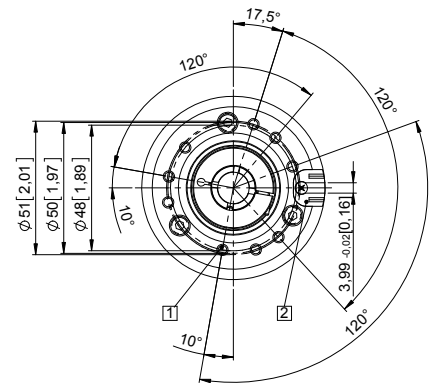
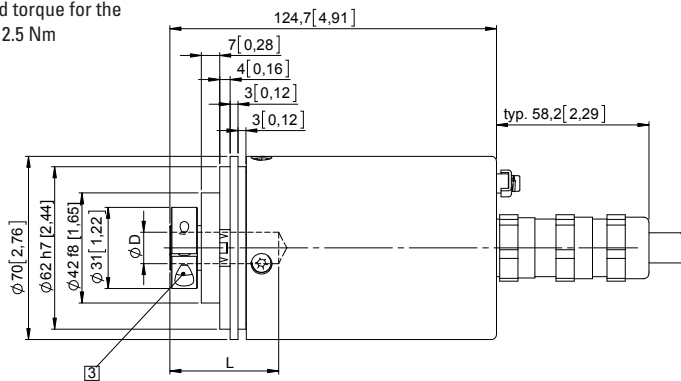
Standard, ATEX/IECEX – mining optical	Sendix 7153 / 7173 (shaft / hollow shaft)	SSI / BiSS
----------------------------------------------	--------------------------------------------------	-------------------

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

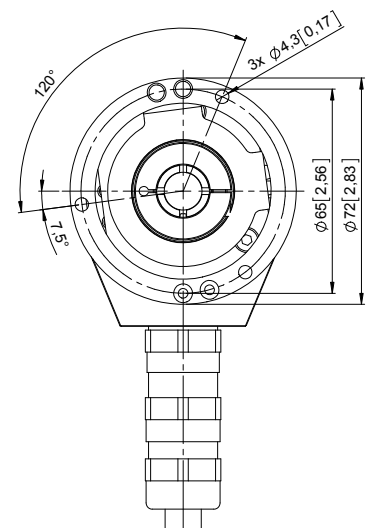
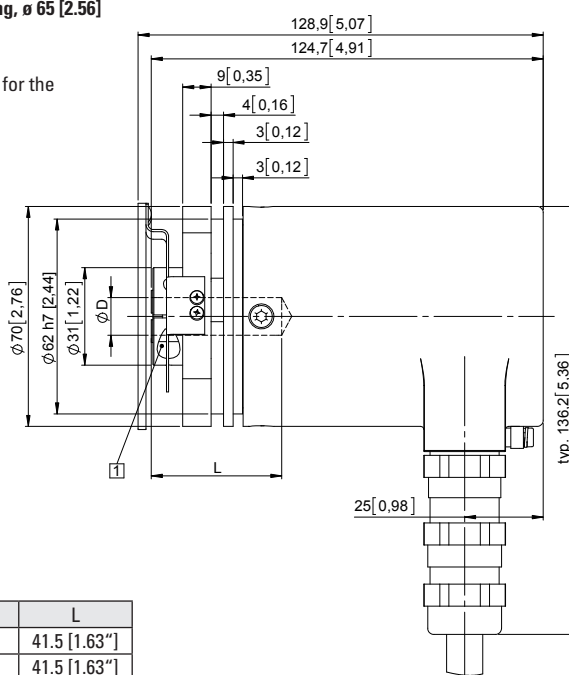


D	Fit	L
12 [0.47]	H7	41.5 [1.63"]
14 [0.55]	H7	41.5 [1.63"]

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