

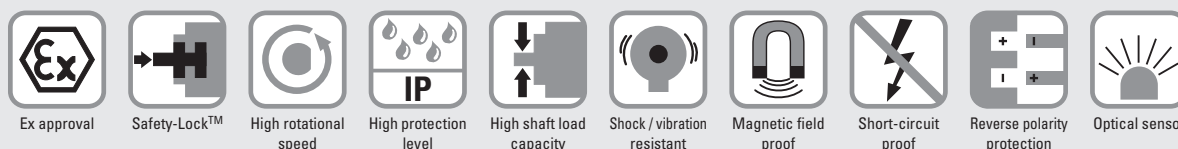
Absolute encoders - singleturn

Standard, ATEX/IECEX – mining optical	Sendix 7153 / 7173 (shaft / hollow shaft)	SSI / BiSS
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The Sendix 7153 / 7173 absolute singleturn encoders in a compact 70 mm stainless-steel housing, with a 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.



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⁾

a Flange 2 = clamping / synchronous flange, IP67, ø 70 mm [2.76"]	e Code B = SSI, binary C = BiSS, binary G = SSI, gray	g Inputs / outputs ²⁾ 2 = SET, DIR input additional status output
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	f Resolution ²⁾ 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 / power supply 2 = SSI, BiSS / 10 ... 30 V DC		i Cable length in dm ¹⁾ 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']		Optional on request - special cable length - other resolutions

1) Not applicable with connection types 1 and 2

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

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Order code	8.7173	.XX2X.XX21.XXXX	Hollow shaft
	Type	a b c d e f g h i ¹⁾	
a Flange	2 = with spring element, short 6 = with stator coupling, IP67, ø 65 mm [2.56"]	e Code B = SSI, binary C = BiSS, binary G = SSI, gray	g Inputs / outputs ²⁾ 2 = SET, DIR input additional status output
b Blind hollow shaft (insertion depth max. 41.5 mm [1.63"])	1 = ø 12 mm [0.47"] 2 = ø 14 mm [0.55"]	f Resolution ²⁾ 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 / power supply	2 = SSI, BiSS / 10 ... 30 V DC		i Cable length in dm ¹⁾ 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

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Technical data

Explosion protection 7153		Explosion protection 7173	
ATEX		ATEX	
EC type-examination certificate	IBExU 14 ATEX 1047 X	EU type-examination certificate	IBExU 15 ATEX 1057 X
Category	Ex I M2 Ex d I/IIC T4 - T6 Mb	Category	Ex I M2 Ex db I/IIC T4/120°C (T4)/T6 Mb
Relevant standards	EN 60079-0:2012; ATEX guideline 94/9/EC	Relevant standards	EN 60079-0:2012 + A11:2013; ATEX guideline 2014/34/EU
IECEx		IECEx	
Certificate of Conformity (CoC)	IECEx IBE 14.0023 X	Certificate of Conformity (CoC)	IECEx IBE 15.0019 X
Category	Ex d I/IIC T4 - T6 Mb	Category	Ex db I/IIC T4/120°C (T4)/T6 Mb
Relevant standards	IEC 60079-0:2011; ATEX guideline 94/9/EC	Relevant standards	IEC 60079-0:2011; IEC 60079-1:2014

Mechanical characteristics		Electrical characteristics	
Maximum speed	shaft 6000 min ⁻¹ (continuous) hollow shaft 3000 min ⁻¹ (continuous)	Power supply	10 ... 30 V DC
Starting torque - at 20°C [68°F]	< 0.05 Nm	Current consumption (no load)	max. 45 mA
Mass moment of inertia	4.0 x 10 ⁻⁶ kgm ²	Reverse polarity protection for power supply	yes
Load capacity of shaft	radial 80 N axial 40 N	Short-circuit proof outputs	yes ³⁾
Weight	approx. 2.8 kg [98.77 oz]	CE compliant acc. to	EMC guideline 2014/30/EU RoHS guideline 2011/65/EU
Protection acc. to EN 60529	IP67	EMC	
Ambient temperature	-40°C ... +60°C [-40 ... +140°F] Please note the specifications for temperature class in EC type-examination certificate!	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
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		

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	
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:	– 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 kOhm
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 kOhm) in normal operation.	

Terminal assignment

Interface	Type of connection	Features	Cable (isolate unused wires individually before initial start-up)												
2	1, 2, A, B	SET, DIR	Signal:	0 V	+V	C+	C-	D+	D-	SET	DIR	Stat	⊥	⊥	
			Cable 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	
Input	HIGH active
Input type	comparator
Signal level (+V = power supply)	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.	

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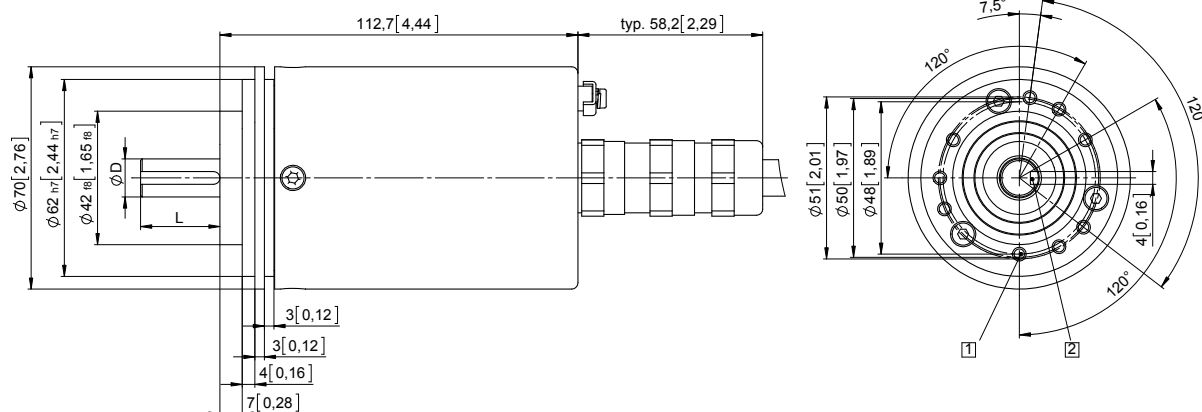
Dimensions shaft version

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

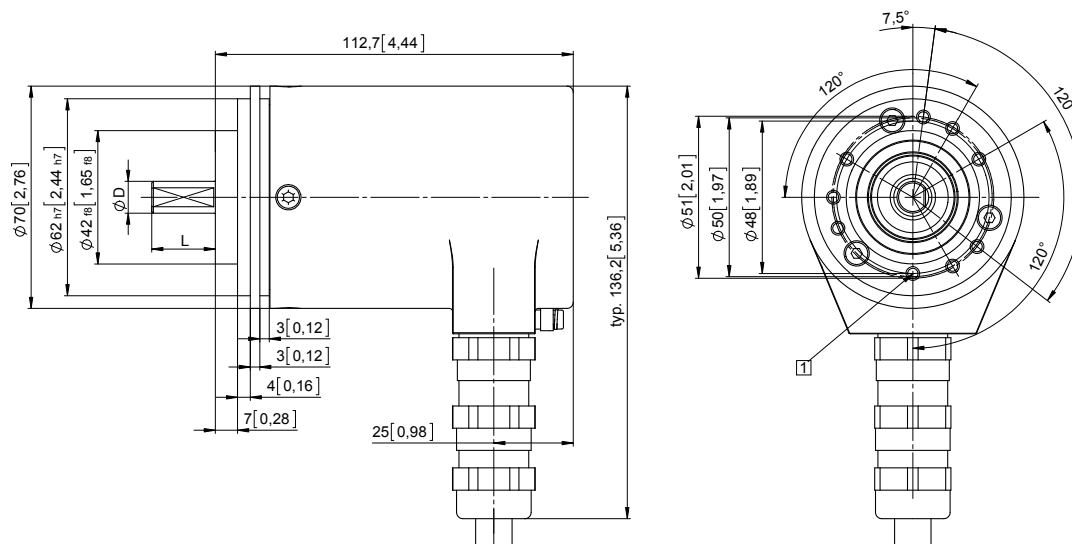


D	Fit	L
12 [0.47]	g6	25 [0.98]

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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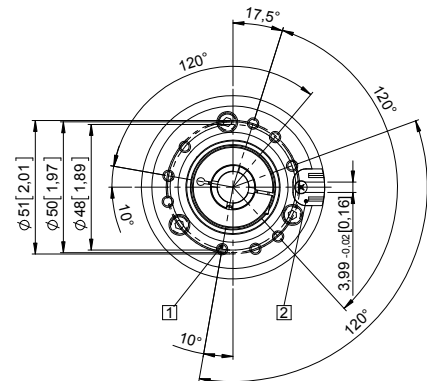
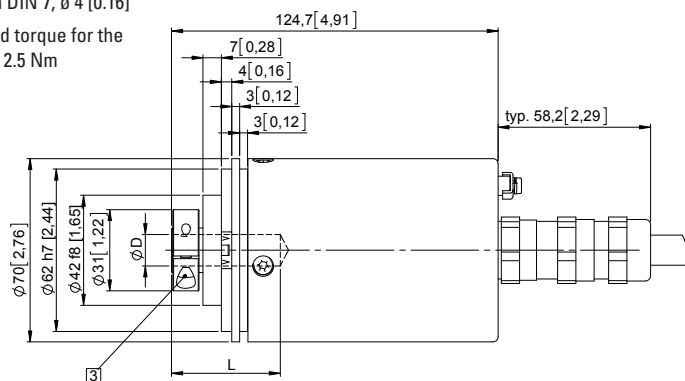
SSI / BiSS

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

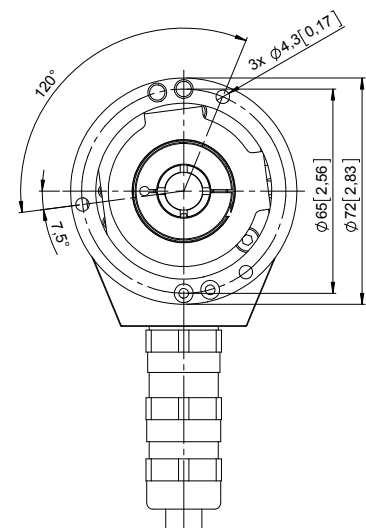
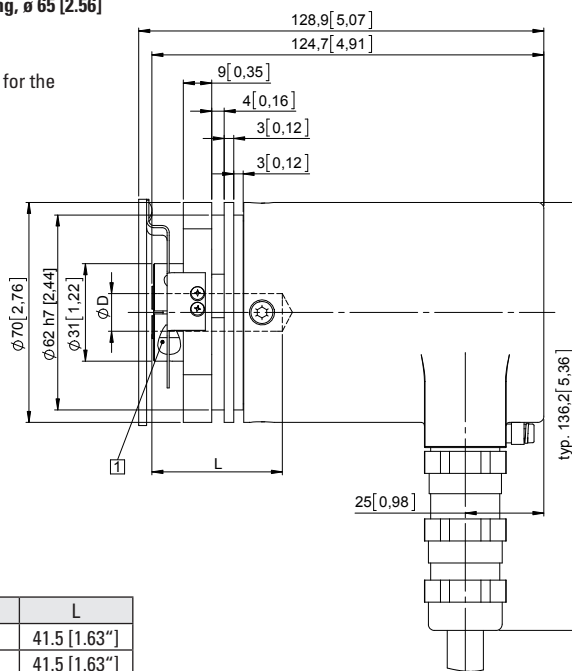


D	Fit	L
12 [0.47]	H7	41.5 [1.63"]
14 [0.55]	H7	41.5 [1.63"]

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