

Incremental encoders

Standard, ATEX/IECEX – zone 1/21 optical	Sendix 7000 / 7020 (shaft / hollow shaft)	Push-pull / RS422
---	--	--------------------------



The Sendix 7000 / 7020 incremental encoders offer Ex protection in a compact 70 mm seawater durable aluminum housing.

These shock and vibration resistant encoders operate flexibly with a resolution of up to 5000 pulses per rotation; 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	Seawater durable

Compact and safe

- Can be used even when space is tight.
- Minimal installation depth, diameter 70 mm.
- Compact cable outlet axial or radial.
- Can be operated in marine environments – housing and flange manufactured from seawater durable aluminum.
- Remains sealed even in harsh everyday use and ensures highest safety against field breakdowns (IP67 protection).

Explosion protection

- “Flameproof-enclosure” version.
- ATEX with EC type examination certificate.
- IECEx with certificate of conformity (CoC).

Order code	8.7000	. 1	X	X	X	. XXXX	. XXXX
Shaft version	Type	a	b	c	d	e	f

<p>a Flange 1 = clamping / synchronous flange, IP67, 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 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</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 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, 5000 (e.g. 100 pulses => 0100)</p>	<p>f Cable length in dm¹⁾ 0050 = 5 m [16.40'] 0100 = 10 m [32.81'] 0150 = 15 m [49.21']</p> <p><i>Optional on request</i> - other pulse rates - special cable length - IP65 version for T6 - seawater resistant (stainless steel V4A)</p> <p><i>Stainless steel V4A as standard types (deliverable as from 1 unit)</i></p> <div style="border: 1px solid black; padding: 2px; display: inline-block;"> V4A 1.4404 </div> <p>8.7000.22X1.XXXX-V4A 8.7000.22XA.XXXX.XXXX-V4A</p>
---	--	---

1) Not applicable with connection types 1 and 2.

Incremental encoders

Standard, ATEX/IECEX – zone 1/21 optical	Sendix 7000 / 7020 (shaft / hollow shaft)	Push-pull / RS422
---	--	--------------------------

Order code Hollow shaft	8.7020 Type	<table border="1" style="font-size: 8px; border-collapse: collapse;"> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;">X</td> <td style="text-align: center;">X</td> <td style="text-align: center;">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> <td style="text-align: center;">d</td> </tr> </table>	X	X	X	X	a	b	c	d	<table border="1" style="font-size: 8px; border-collapse: collapse;"> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;">X</td> <td style="text-align: center;">X</td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;">e</td> <td colspan="3"></td> </tr> </table>	X	X	X	X	e				<table border="1" style="font-size: 8px; border-collapse: collapse;"> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;">X</td> <td style="text-align: center;">X</td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;">f</td> <td colspan="3"></td> </tr> </table>	X	X	X	X	f				<div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <p>a Flange</p> <p>1 = with spring element, short 5 = with stator coupling, IP67, ø 65 mm [2.56"]</p> <p>b Blind hollow shaft (insertion depth max. 41.5 mm [1.63"])</p> <p>1 = ø 12 mm [0.47"] 2 = ø 14 mm [0.55"]</p> <p>c Output circuit / power supply</p> <p>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</p> </div> <div style="width: 30%;"> <p>d Type of connection</p> <p>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 Pulse rate</p> <p>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)</p> </div> <div style="width: 30%;"> <p>f Cable length in dm ¹⁾</p> <p>0050 = 5 m [16.40'] 0100 = 10 m [32.81'] 0150 = 15 m [49.21']</p> <p><i>Optional on request</i></p> <ul style="list-style-type: none"> - other pulse rates - special cable length - IP65 version for T6 - seawater resistant (stainless steel V4A) <p><i>Stainless steel V4A as standard types (deliverable as from 1 unit)</i></p> <div style="border: 1px solid black; padding: 2px; display: inline-block; font-size: 8px;"> V4A 1.4404 </div> <p>8.7020.22X1.XXXX-V4A 8.7020.22XA.XXXX.XXXX-V4A</p> </div> </div>
X	X	X	X																										
a	b	c	d																										
X	X	X	X																										
e																													
X	X	X	X																										
f																													

Mounting accessory for shaft encoders	Order no.
Coupling	bellows coupling ø 19 mm [0.75"] for shaft 10 mm [0.39"]
	8.0000.1102.1010

Further accessories can be found in the accessories section or in the accessories area of our website at: www.kuebler.com/accessories.
Additional connectors can be found in the connection technology section or in the connection technology area of our website at: www.kuebler.com/connection_technology.

Technical data

Explosion protection Sendix 7000	
ATEX	
EC type-examination certificate	PTB09 ATEX 1106 X
Category (gas)	II 2 G Ex d IIC T4 - T6 Gb
Category (dust)	II 2D Ex tb IIIC T135°C - T85°C Db
Relevant standards ATEX guideline 94/9/EC	EN 60079-0:2012; EN 60079-1:2014; EN 60079-31:2009
IECEX	
Certificate of Conformity (CoC)	IECEX PTB 13.0026 X
Category (gas)	Ex d IIC T4 - T6 Gb
Category (dust)	Ex tb IIIC T135°C - T85°C Db
Relevant standards	IEC 60079-0:2011; IEC 60079-1:2014; IEC 60079-31:2008

Explosion protection Sendix 7020	
ATEX	
EU type-examination certificate	IBExU 15 ATEX 1091 X
Category (gas)	II 2 G Ex db IIC T4/120°C (T4)/T6 Gb
Category (dust)	II 2 D Ex tb IIIC T135°C - T85°C Db
Relevant standards ATEX guideline 2014/34/EU	EN 60079-0:2012 + A11:2013; EN 60079-1:2014; EN 60079-31:2014
IECEX	
Certificate of Conformity (CoC)	IECEX IBE 15.0020 X
Category (gas)	Ex db IIC T4/120°C (T4)/T6 Gb
Category (dust)	Ex tb IIIC T135°C - T85°C Db
Relevant standards	IEC 60079-0:2011; IEC 60079-1:2014; IEC 60079-31:2013

1) Not applicable with connection types 1 and 2.

Incremental encoders

Standard, ATEX/IECEX – zone 1/21 optical	Sendix 7000 / 7020 (shaft / hollow shaft)	Push-pull / RS422
---	--	--------------------------

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. 1.5 kg [52.91 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	seawater durable Al, type AlSiMgMn (EN AW-6082)
	cable	PUR
Shock resistance		
acc. to EN/IEC 60068-2-27		2500 m/s ² , 6 ms
Vibration resistance		
acc. to EN/IEC 60068-2-6		100 m/s ² , 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

Electrical characteristics					
Output circuit		RS422 (TTL compatible)	RS422 (TTL compatible)	Push-pull	Push-pull (7272 compatible)
	Order code	1	4	5	2
Power supply		5 ... 30 V DC	5 V DC (±5 %)	10 ... 30 V DC	5 ... 30 V DC
Power consumption (no load)		typ. 40 mA max. 90 mA	typ. 40 mA max. 90 mA	typ. 50 mA max. 100 mA	typ. 50 mA max. 100 mA
Permissible load / channel		max. +/- 20 mA	max. +/- 20 mA	max. +/- 20 mA	max. +/- 20 mA
Pulse frequency		max. 300 kHz	max. 300 kHz	max. 300 kHz	max. 300 kHz ¹⁾
Signal level	HIGH LOW	min. 2.5 V 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
Rising edge time t_r		max. 200 ns	max. 200 ns	max. 1 μs	max. 1 μs
Falling edge time t_f		max. 200 ns	max. 200 ns	max. 1 μs	max. 1 μs
Short circuit proof outputs²⁾		yes ³⁾	yes ³⁾	yes	yes
Reverse polarity protection of the power supply		yes	no	yes	no
CE compliant acc. to		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 _{sens}	+V _{sens}	⊥	
		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_{sens} / +V_{sens}: 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 / cosine signal
- B, \bar{B} : Incremental output channel B / sine signal
- 0, $\bar{0}$: Reference signal
- ⊥: 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.

Incremental encoders

**Standard, ATEX/IECEX – zone 1/21
optical**

Sendix 7000 / 7020 (shaft / hollow shaft)

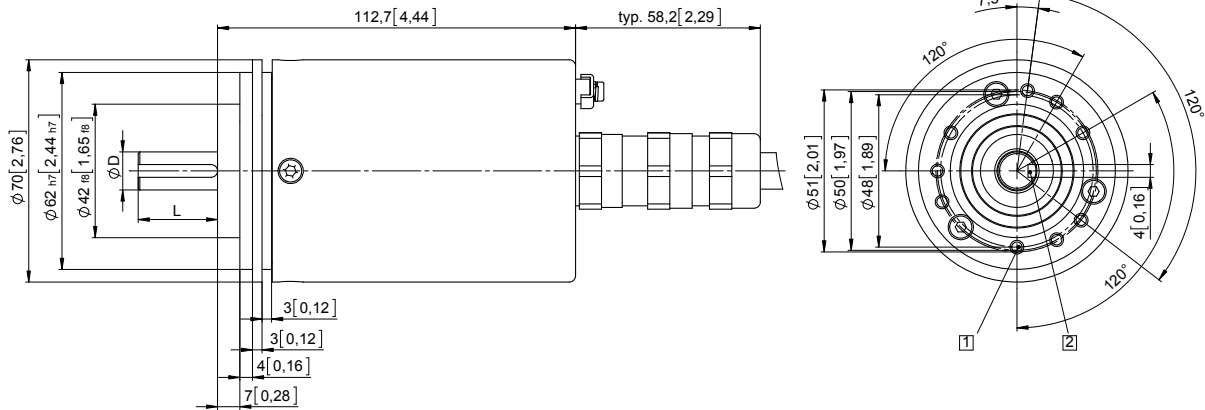
Push-pull / RS422

Dimensions shaft version

Dimensions in mm [inch]

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

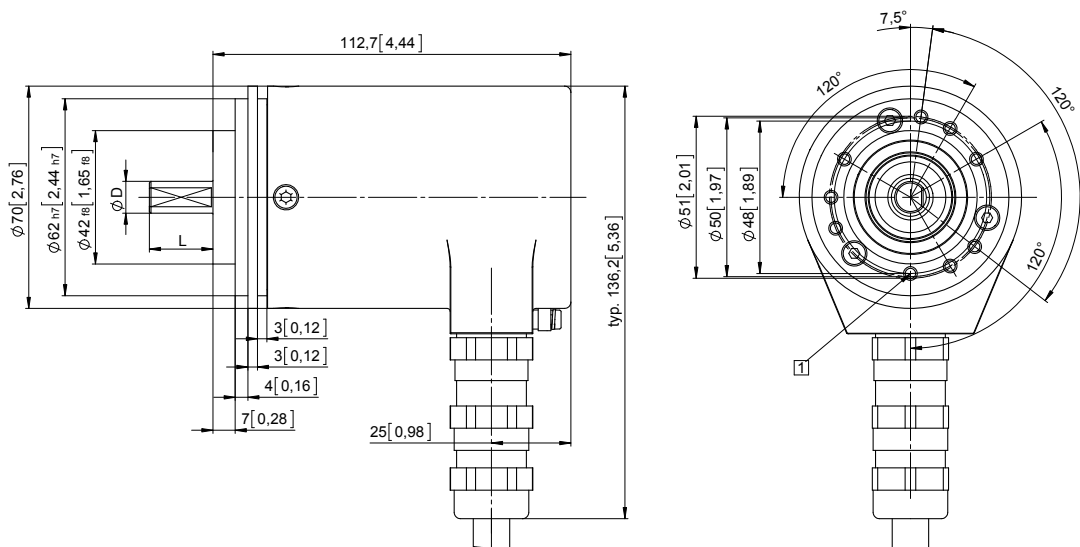
- 1 9 x M4, 10 [0.39] deep
- 2 Keyway for DIN 6885-A-4x4x25 key



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

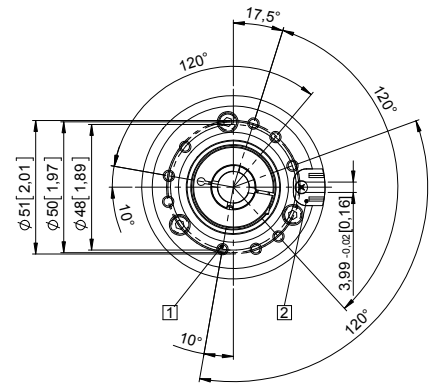
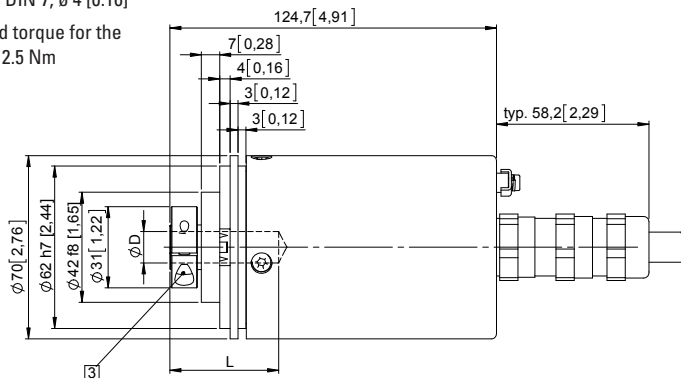
Standard, ATEX/IECEX – zone 1/21 optical	Sendix 7000 / 7020 (shaft / hollow shaft)	Push-pull / RS422
---	--	--------------------------

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



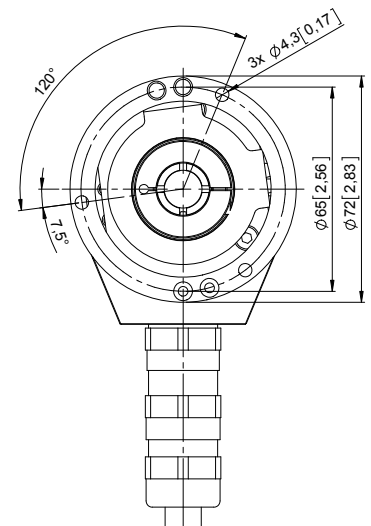
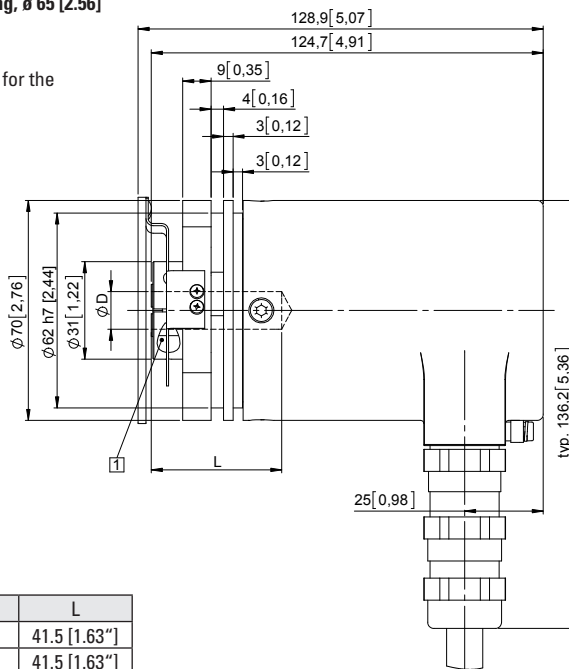
D	Fit	L
12 [0.47]	H7	41.5 [1.63"]
14 [0.55]	H7	41.5 [1.63"]

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