

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.



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 Shaft version

8.7000 . 1 X X X . XXXX . XXXX
Type a b c d e f

a Flange

1 = 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, 100, 200, 250, 256,
360, 400, 500, 512, 600, 800, 1000,
1024, 1200, 2000, 2048, 2500, 3600,
4096, 5000
(e.g. 100 pulses => 0100)

f Cable length in dm ¹⁾

0050 = 5 m [16.40']

0100 = 10 m [32.81']

0150 = 15 m [49.21']

Optional on request

- other pulse rates

- special cable length

- IP65 version for T6

- seawater resistant (stainless steel V4A)

Stainless steel V4A as standard types
(deliverable as from 1 unit)

V4A 8.7000.12X1.XXXX-V4A
8.7000.12XA.XXXX.XXXX-V4A

1.4404

1) Not applicable with connection types 1 and 2.

Incremental encoders

| | | |
|---|--|--------------------------|
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|---|--|--------------------------|

| | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|---|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|--|--|--|--|
| Order code Hollow shaft | 8.7020 Type | <table border="1" style="margin: auto;"> <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> <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> <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> <td style="text-align: center;">e</td> <td style="text-align: center;">f</td> <td colspan="4"></td> </tr> </table> | 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 | | | | | | | | | | | | | | |
| a | b | c | d | e | f | | | | | | | | | | | | | | | | | | |
| a Flange 1 = with spring element, short 5 = with stator coupling, IP67, ø 65 mm [2.56"] | 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 Cable length in dm ¹⁾ 0050 = 5 m [16.40'] 0100 = 10 m [32.81'] 0150 = 15 m [49.21'] | | | | | | | | | | | | | | | | | | | | | |
| 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"] | e Pulse rate 1, 5, 10, 12, 36, 100, 200, 250, 256, 360, 400, 500, 512, 600, 800, 1000, 1024, 1200, 2000, 2048, 2500, 3600, 4096, 5000 (e.g. 100 pulses => 0100) | <i>Optional on request</i> - other pulse rates - special cable length - IP65 version for T6 - seawater resistant (stainless steel V4A) | | | | | | | | | | | | | | | | | | | | | |
| 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 | | <i>Stainless steel V4A as standard types (deliverable as from 1 unit)</i> 8.7020.12X1.XXXX-V4A 8.7020.12XA.XXXX.XXXX-V4A | <div style="border: 1px solid black; padding: 2px; display: inline-block;"> V4A <small>1.4404</small> </div> | | | | | | | | | | | | | | | | | | | | |

Incremental encoders

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|--|-------------------------|
| Mounting accessory for shaft encoders | Order no. |
| Coupling | 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 |

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| Standard, ATEX/IECEX – zone 1/21 optical | Sendix 7000 / 7020 (shaft / hollow shaft) | Push-pull / RS422 |
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| 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 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 |
| 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 outputs ²⁾ | 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 wires 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} | ⊥ |
| | | Cable 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.

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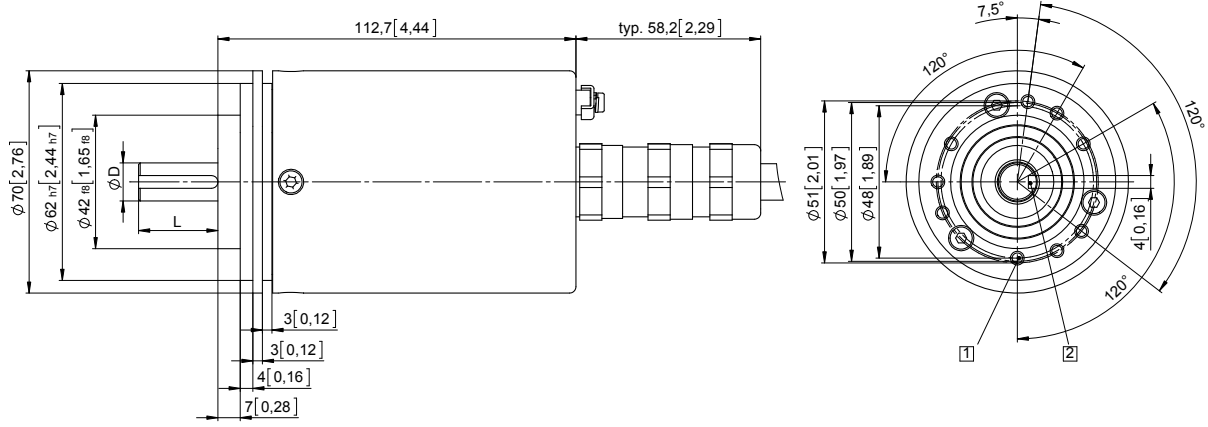
Dimensions shaft version

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

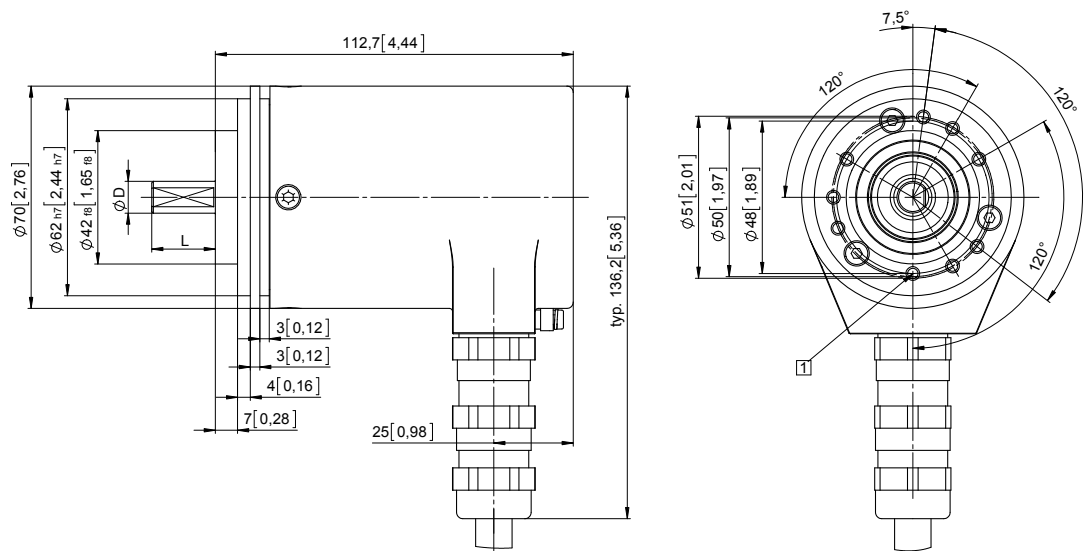


| D | Fit | L |
|-----------|-----|-----------|
| 12 [0.47] | g6 | 25 [0.98] |

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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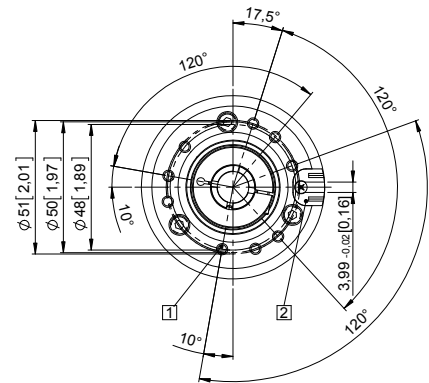
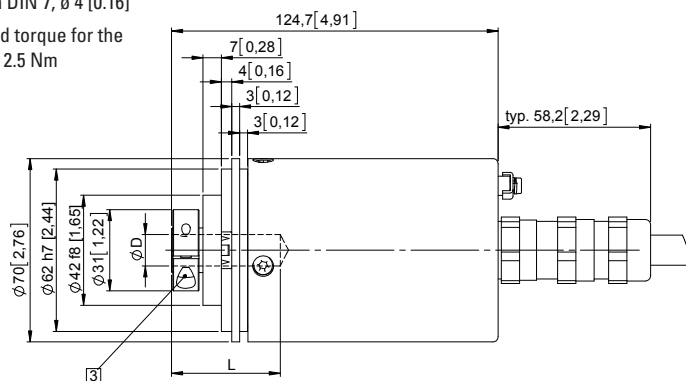
Push-pull / RS422

Dimensions hollow shaft version

Dimensions in mm [inch]

Flange with spring element, short Flange type 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



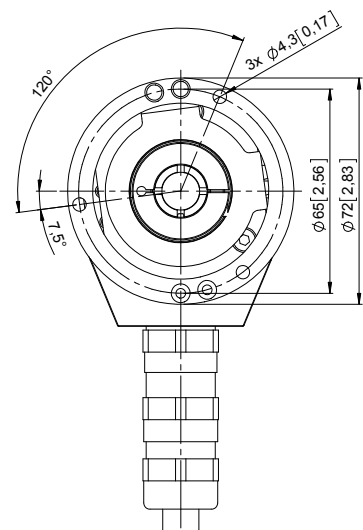
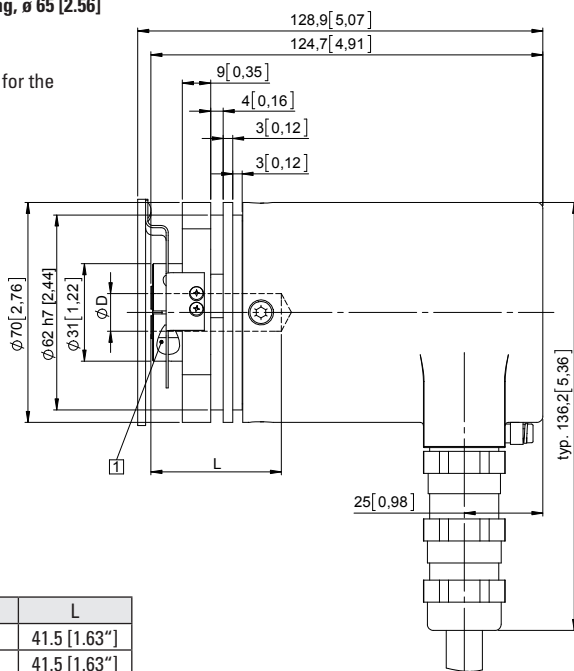
| D | Fit | L |
|-----------|-----|--------------|
| 12 [0.47] | H7 | 41.5 [1.63"] |
| 14 [0.55] | H7 | 41.5 [1.63"] |

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