

# Absolute encoders – multiturn

Standard, ATEX/IECEX – zone 1/21  
mechanical multiturn, optical

Sendix 7068 / 7088 (shaft / hollow shaft)

CANopen



The Sendix 7068 / 7088 absolute multiturn encoders offer Ex protection in a compact 70 mm seawater durable aluminum housing, with a CANopen interface and optical sensor technology.

These shock and vibration-resistant encoders operate flexibly with a resolution of up to 28 bits; they are also available with axial and radial cable outlets.



Ex approval



Mechanical drive



Safety-Lock™



High rotational speed



High protection level



High shaft load capacity



Shock / vibration resistant



Magnetic field 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 EU type examination certificate.
- IECEx with certificate of conformity (CoC).

## Order code

### Shaft version

8.7068 . 1 X 2 X . 21 21 . XXXX  
Type a b c d e f 1)

#### a Flange

1 = clamping / synchronous flange,  $\varnothing$  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 Interface / supply voltage

2 = CANopen DS301 V4.02 / 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 Fieldbus profile

21 = CANopen

#### f Cable length in dm 1)

0050 = 5 m [16.40']  
0100 = 10 m [32.81']  
0150 = 15 m [49.21']

#### Optional on request

- special cable length
- seawater resistant (stainless steel V4A)

1) Not applicable with connection types 1 and 2.

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|                                                                           |                                                  |                |
|---------------------------------------------------------------------------|--------------------------------------------------|----------------|
| <b>Standard, ATEX/IECEX – zone 1/21<br/>mechanical multiturn, optical</b> | <b>Sendix 7068 / 7088 (shaft / hollow shaft)</b> | <b>CANopen</b> |
|---------------------------------------------------------------------------|--------------------------------------------------|----------------|

|                                                                                                                     |                                                                                                                                                                                         |                                                                                                    |                  |                      |
|---------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|------------------|----------------------|
| <b>Order code</b><br><b>Hollow shaft</b>                                                                            | <b>8.7088</b><br>Type                                                                                                                                                                   | <b>.XX2X.</b><br>a b c d                                                                           | <b>2121</b><br>e | <b>.XXXX</b><br>f 1) |
| <b>a Flange</b><br>1 = with spring element, short<br>5 = with stator coupling, ø 65 mm [2.56"]                      | <b>d Type of connection</b><br>1 = axial cable, 2 m [6.56'] PUR<br>2 = radial cable, 2 m [6.56'] PUR<br>A = axial cable, length > 2 m [6.56']<br>B = radial cable, length > 2 m [6.56'] | <b>Optional on request</b><br>- special cable length<br>- seawater resistant (stainless steel V4A) |                  |                      |
| <b>b Blind hollow shaft</b><br>(insertion depth max. 41.5 mm [1.63"])<br>1 = ø 12 mm [0.47"]<br>2 = ø 14 mm [0.55"] | <b>e Fieldbus profile</b><br>21 = CANopen                                                                                                                                               |                                                                                                    |                  |                      |
| <b>c Interface / supply voltage</b><br>2 = CANopen DS301 V4.02 / 10 ... 30 V DC                                     | <b>f Cable length in dm 1)</b><br>0050 = 5 m [16.40']<br>0100 = 10 m [32.81']<br>0150 = 15 m [49.21']                                                                                   |                                                                                                    |                  |                      |

|                                              |                                                          |
|----------------------------------------------|----------------------------------------------------------|
| <b>Mounting accessory for shaft encoders</b> | Order no.                                                |
| <b>Coupling</b>                              | bellows coupling ø 19 mm [0.75"] for shaft 10 mm [0.39"] |
|                                              | <b>8.0000.1102.1010</b>                                  |

Further Kübler accessories can be found at: [kuebler.com/accessories](http://kuebler.com/accessories)

Further Kübler cables and connectors can be found at: [kuebler.com/connection-technology](http://kuebler.com/connection-technology)

## Technical data

| Explosion protection            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ATEX                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| EU type-examination certificate | IBExU 15 ATEX 1091 X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Category (gas)                  | <div><div>Sendix 7068 – 6000 rpm</div><div>Sendix 7068 – 2000 rpm</div><div>Sendix 7088 – 3000 rpm</div><div>Sendix 7088 – 2000 rpm</div></div> <div><div> II 2G Ex db IIC T4 Gb</div><div> II 2G Ex db IIC T5 Gb</div><div> II 2G Ex db IIC T4 Gb</div><div> II 2G Ex db IIC 120°C (T4) Gb</div></div>             |
| Category (dust)                 | <div><div>Sendix 7068 – 6000 rpm</div><div>Sendix 7068 – 2000 rpm</div><div>Sendix 7088 – 3000 rpm</div><div>Sendix 7088 – 2000 rpm</div></div> <div><div> II 2D Ex tb IIIC T135°C Db</div><div> II 2D Ex tb IIIC T100°C Db</div><div> II 2D Ex tb IIIC T135°C Db</div><div> II 2D Ex tb IIIC T120°C Db</div></div> |
| Relevant standards              | EN 60079-0:2018                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| ATEX guideline 2014/34/EU       | EN 60079-1:2014                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                 | EN 60079-31:2014                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| IECEX                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Certificate of Conformity (CoC) | IECEX IBE 15.0020 X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Category (gas)                  | <div><div>Sendix 7068 – 6000 rpm</div><div>Sendix 7068 – 2000 rpm</div><div>Sendix 7088 – 3000 rpm</div><div>Sendix 7088 – 2000 rpm</div></div> <div><div>Ex db IIC T4 Gb</div><div>Ex db IIC T5 Gb</div><div>Ex db IIC T4 Gb</div><div>Ex db IIC 120°C (T4) Gb</div></div>                                                                                                                                                                                                                                                                                                                                                                                     |
| Category (dust)                 | <div><div>Sendix 7068 – 6000 rpm</div><div>Sendix 7068 – 2000 rpm</div><div>Sendix 7088 – 3000 rpm</div><div>Sendix 7088 – 2000 rpm</div></div> <div><div>Ex tb IIIC T135°C Db</div><div>Ex tb IIIC T100°C Db</div><div>Ex tb IIIC T135°C Db</div><div>Ex tb IIIC T120°C Db</div></div>                                                                                                                                                                                                                                                                                                                                                                         |
| Relevant standards              | IEC 60079-0:2017                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                 | IEC 60079-1:2014                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                 | IEC 60079-31:2013                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

| Electrical characteristics                     |                |
|------------------------------------------------|----------------|
| Supply voltage                                 | 10 ... 30 V DC |
| Current consumption (no load)                  | max. 100 mA    |
| Reverse polarity protection for supply voltage | yes            |

| Mechanical characteristics               |                                                                                                                                                                                       |
|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Maximum speed                            | <div><div>shaft</div><div>hollow shaft</div></div> <div><div>6000 min<sup>-1</sup> (continuous)</div><div>3000 min<sup>-1</sup> (continuous)</div></div>                              |
| Starting torque – at 20 °C [68 °F]       | < 0.05 Nm                                                                                                                                                                             |
| Mass moment of inertia                   | 4.0 x 10 <sup>-6</sup> kgm <sup>2</sup>                                                                                                                                               |
| Load capacity of shaft                   | <div><div>radial</div><div>axial</div></div> <div><div>80 N</div><div>40 N</div></div>                                                                                                |
| Weight                                   | approx. 1.5 kg [52.91 oz]                                                                                                                                                             |
| Protection acc. to EN 60529              | IP67                                                                                                                                                                                  |
| Ambient temperature                      | -40 °C ... +60 °C [-40 °F ... +140 °F]<br>please note the specifications for temperature class in EU type-examination certificate!                                                    |
| Material                                 | <div><div>shaft</div><div>flange / housing</div><div>cable</div></div> <div><div>stainless steel</div><div>seawater durable Al, type AlSiMgMn (EN AWW-6082)</div><div>PUR</div></div> |
| Shock resistance to EN/IEC 60068-2-27    | 2500 m/s <sup>2</sup> , 6 ms                                                                                                                                                          |
| Vibration resistance to EN/IEC 60068-2-6 | 100 m/s <sup>2</sup> , 55 ... 2000 Hz                                                                                                                                                 |

| EMC                |                  |
|--------------------|------------------|
| Relevant standards | EN 55011 class B |
|                    | EN (IEC) 61326-1 |

1) Not applicable with connection types 1 and 2.

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| Interface characteristics CANopen  |                                                                                |
|------------------------------------|--------------------------------------------------------------------------------|
| <b>Resolution singleturn (MUR)</b> | scalable 1 ... 65 536 (16 bit)<br>default 8 192 (13 bit)                       |
| <b>Number of revolutions (NDR)</b> | 1 ... 4 096 (12 bit)<br>scalable only via the total resolution                 |
| <b>Total resolution (TMR)</b>      | scalable 1 ... 268 435 456 (28 bit)<br>default 33 554 432 (25 bit)             |
| <b>Interface</b>                   | CAN high-speed acc. to ISO 11898, Basic- and Full-CAN, CAN specification 2.0 B |
| <b>Protocol</b>                    | CANopen profile DS406 V3.2 with manufacturer-specific add-ons                  |
| <b>Baud rate</b>                   | 10 ... 1000 kbit/s<br>software configurable                                    |
| <b>Node address</b>                | 1 ... 127<br>software configurable                                             |
| <b>Switchable termination</b>      | software configurable                                                          |

| Approvals                              |            |
|----------------------------------------|------------|
| <b>CE compliant</b> in accordance with |            |
| EMC Directive                          | 2014/30/EU |
| RoHS Directive                         | 2011/65/EU |
| ATEX Directive                         | 2014/34/EU |

## General information about CANopen

The CANopen encoders support the latest CANopen communication profile according to DS301 V4.02. In addition, device-specific profiles like the encoder profile DS406 V3.2 are available.

The following operating modes may be selected: Polled Mode, Cyclic Mode, Sync Mode and a High Resolution Sync Protocol. Moreover, scale factors, preset values, limit switch values and many other additional parameters can be programmed via the CANbus. When switching the device on, all parameters are loaded from an EEPROM, where they were saved previously to protect them against power-failure.

As output values **position**, **speed**, **acceleration** as well as the **working area status** may be combined freely as PDO (PDO mapping)

## CANopen communication profile DS301 V4.02

Among others, the following functionality is integrated:

Class C2 functionality

- NMT slave.
- Heartbeat protocol.
- High resolution sync protocol.
- Identity object.
- Error behavior object.
- Variable PDO mapping self-start programmable (power on to operational), 3 Sending PDO's.
- Node address, baud rate and CANbus programmable termination.

## CANopen encoder profile DS406 V3.2

The following parameters can be programmed:

- Event mode.
- Units for speed selectable (steps/sec or min<sup>-1</sup>).
- Factor for speed calculation (e.g. measuring wheel circumference)  
Integration time for speed value of 1...32.
- 2 work areas with 2 upper and lower limits and the corresponding output states.
- Variable PDO mapping of position, speed, acceleration, working area status.
- Extended failure management for position sensing with integrated temperature control.
- User interface with visual display of bus and failure status - 3 LED's.
- Optional - 32 CAMs programmable.
- Customer-specific memory - 16 Bytes.

## Universal scaling function

At the end of the physical resolution of an encoder, **when scaling is active**, an error appears if the division of the physical limit (GP\_U) by the programmed total resolution (TMR) does not produce an integer.

The universal scaling function remedies this problem.

## Terminal assignment

| Interface | Type of connection | Cable (isolate unused cores individually before initial start-up) |     |    |       |       |         |       |       |         |
|-----------|--------------------|-------------------------------------------------------------------|-----|----|-------|-------|---------|-------|-------|---------|
| 2         | 1, 2, A, B         | Signal:                                                           | 0 V | +V | CAN_H | CAN_L | CAN_GND | CAN_H | CAN_L | CAN_GND |
|           |                    | Core marking:                                                     | 1   | 2  | 4     | 5     | 6       | 7     | 8     | 9       |

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mechanical multiturn, optical**

**Sendix 7068 / 7088 (shaft / hollow shaft)**

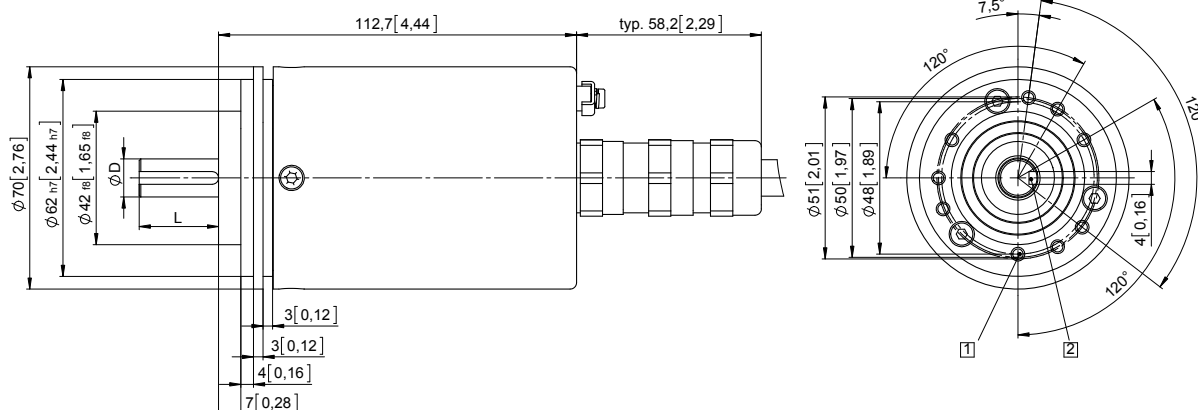
**CANopen**

## Dimensions shaft version

Dimensions in mm [inch]

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

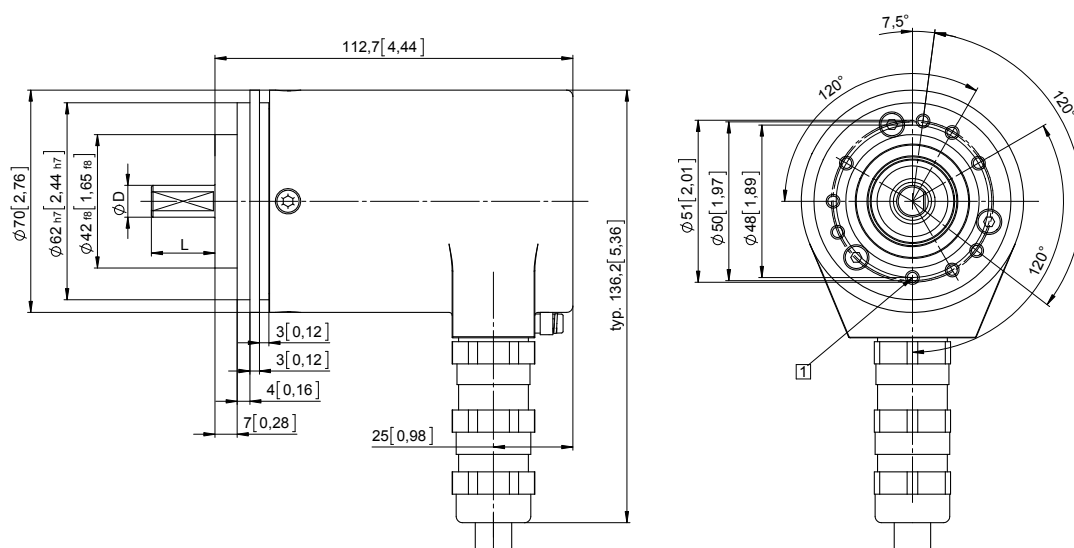
- [1] 9 x M4, 10 [0.39] deep
- [2] Keyway for DIN 6885-A-4x4x25 key



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

**Clamping / synchronous flange, ø 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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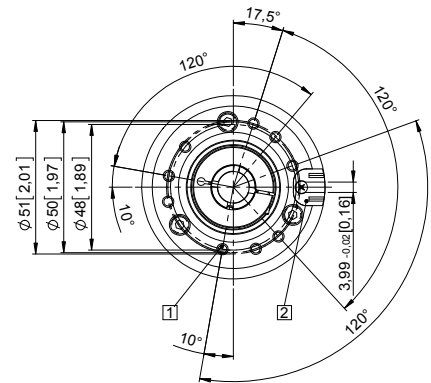
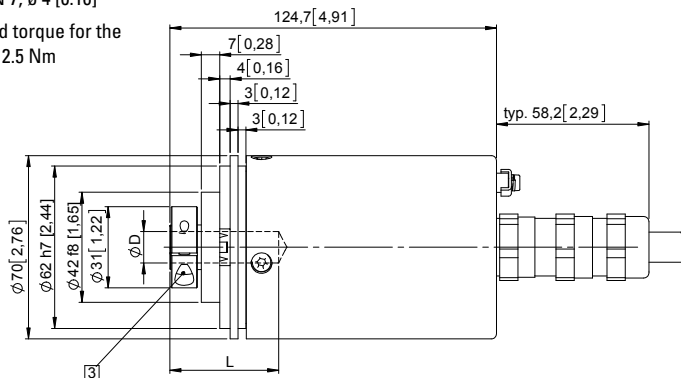
**CANopen**

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

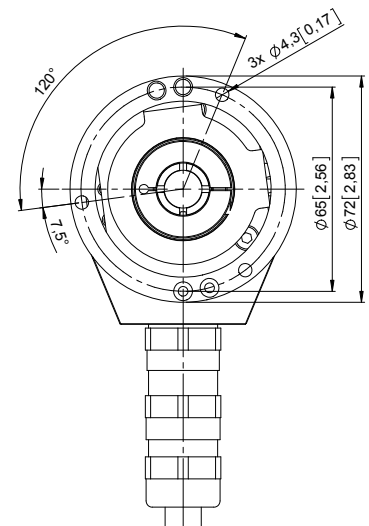
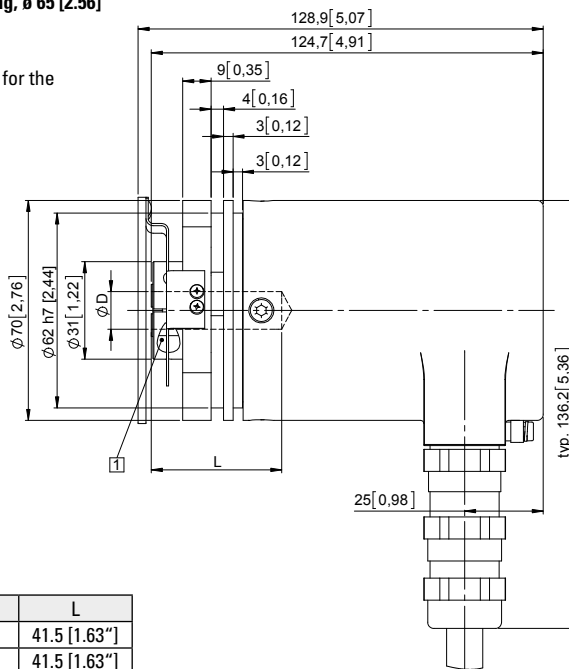


| D         | Fit | L            |
|-----------|-----|--------------|
| 12 [0.47] | H7  | 41.5 [1.63"] |
| 14 [0.55] | H7  | 41.5 [1.63"] |

L = insertion depth max. blind hollow shaft

### Flange with stator coupling, $\varnothing$ 65 [2.56] Flange type 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