Standard, ATEX / IECEx – mining M2
mechanical multiturn, optical

Sendix 7168 / 7188 (shaft / hollow shaft)

CANopen

The Sendix 7168 / 7188 absolute multiturn encoders in a compact 70 mm stainless-steel housing, with a CANopen interface and optical sensor technology have an ATEX/IECEx mining M2 approval.

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

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 M2 approval.
- "Flame-proof enclosure" construction.
- ATEX with EU type examination certificate.
- IECEx with certificate of conformity (CoC).

Order code Shaft version

8.7168	.	2	X	2	X	.	21	21	.	XXXX
Type		a	b	c	d		e			f [1]

a *Flange*
2 = clamping / synchronous flange, ø 70 mm [2.76"]

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

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

Order code Hollow shaft

8.7188	.	X	X	2	X	.	21	21	.	XXXX
Type		a	b	c	d		e			f [1]

a *Flange*
2 = with spring element, short
6 = with stator coupling, ø 65 mm [2.56"]

b *Blind hollow shaft*
(insertion depth max. 41.5 mm [1.63"])
1 = ø 12 mm [0.47"]
2 = ø 14 mm [0.55"]

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

1) Not applicable with connection types 1 and 2.

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Technical data

Explosion protection

ATEX

EU type-examination certificate	IBExU 15 ATEX 1057 X
Category	
Sendix 7168 – 6000 rpm	Ex I M2 Ex db I/IIC T4 Mb
Sendix 7168 – 2000 rpm	Ex I M2 Ex db I/IIC T5 Mb
Sendix 7188 – 3000 rpm	Ex I M2 Ex db I/IIC T4 Mb
Sendix 7188 – 2000 rpm	Ex I M2 Ex db I/IIC 120°C (T4) Mb
Relevant standards	EN 60079-0:2018
ATEX guideline 2014/34/EU	EN 60079-1:2014

IECEx

Certificate of Conformity (CoC)	IECEx IBE 15.0019 X
Category	
Sendix 7168 – 6000 rpm	Ex db I/IIC T4 Mb
Sendix 7168 – 2000 rpm	Ex db I/IIC T5 Mb
Sendix 7188 – 3000 rpm	Ex db I/IIC T4 Mb
Sendix 7188 – 2000 rpm	Ex db I/IIC 120°C (T4) Mb
Relevant standards	IEC 60079-0:2017 IEC 60079-1:2014

EMC

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

Approvals

CE compliant in accordance with	
EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU
ATEX Directive	2014/34/EU

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	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 [-40 °F ... +140 °F] Please note the specifications for temperature class in EU 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

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

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^{-1}).
- 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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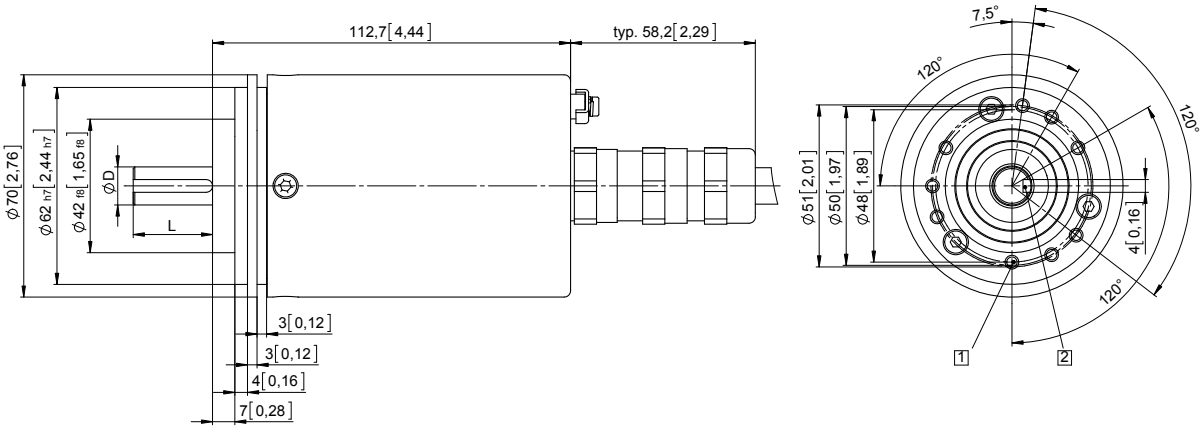
Dimensions shaft version

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

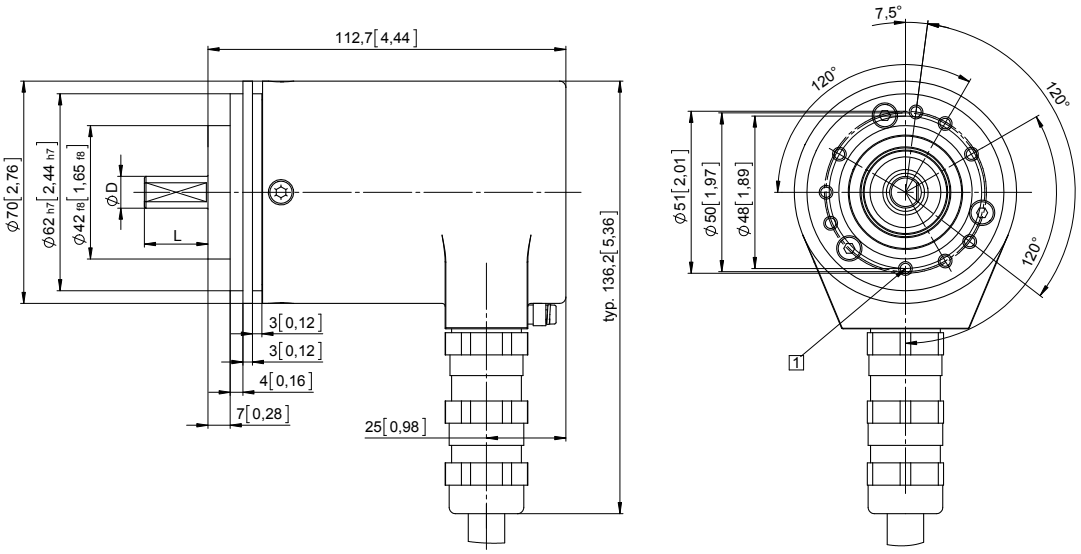
2 Keyway for DIN 6885-A-4x4x25 key



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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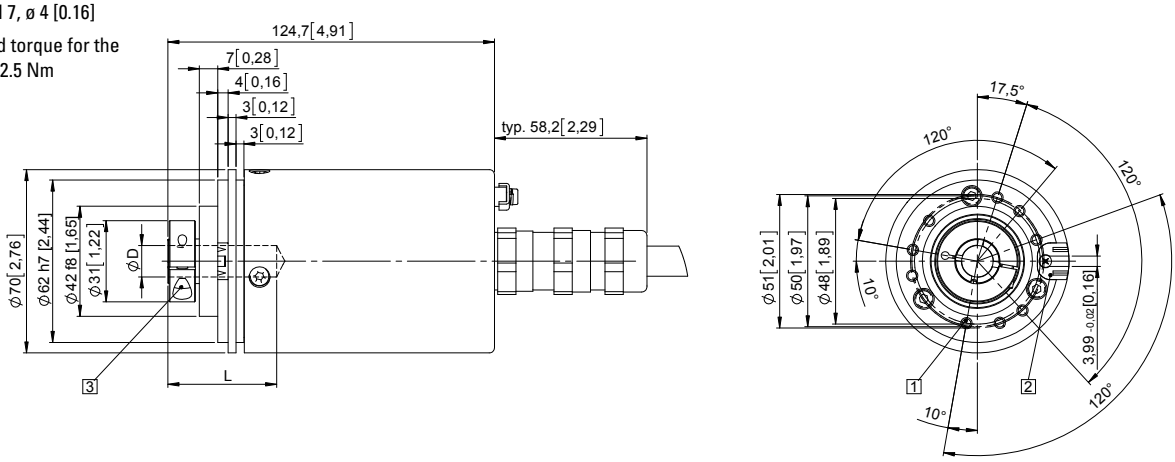
Standard, ATEX/IECEx – mining M2 mechanical multiturn, optical | **Sendix 7168 / 7188 (shaft / hollow shaft)** | **CANopen**

Dimensions hollow shaft version

Dimensions in mm [inch]

Flange with spring element, short
Flange type 2

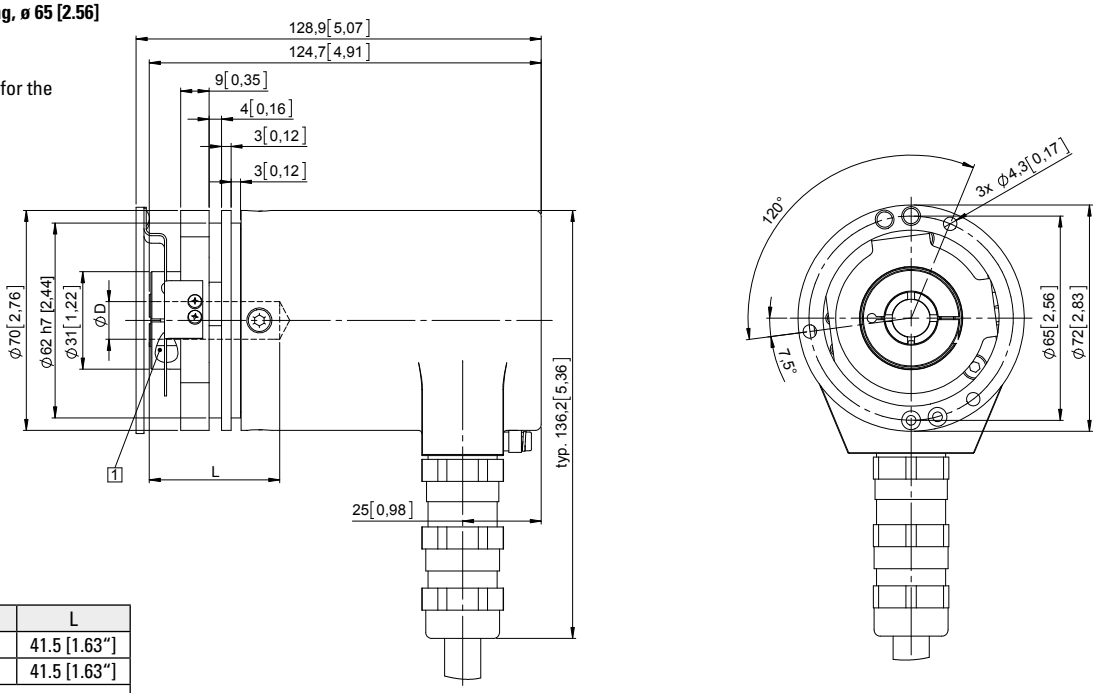
1 9 x M4, 10 [0.39] deep
2 Slot spring element, recommendation: torque pin DIN 7, ø 4 [0.16]
3 Recommended torque for the clamping ring 2.5 Nm



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, ø 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		

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