

Absolute Encoders - Singleturn

Standard ATEX/IECEx – Zone 1/21, SIL2/PLd, optical	Sendix SIL 7053FS2 (Shaft)	SSI/BiSS + SinCos
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Ex protection and Functional Safety in one device.

The absolute singleturn encoders 7053FS2 of the Sendix SIL family are suited for use in safety-related applications up to SIL2 acc. to EN 61800-5-2 or PLd to EN ISO 13849-1.

In addition, these devices ensure Ex protection in a compact 70 mm housing out of seawater-resistant aluminium.



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-resistant

Functional Safety

- Encoder with individual certificate from IFA / TÜV.
- Suitable for applications up to SIL2 acc. to EN 61800-5-2.
- Suitable for applications up to PLd acc. to EN ISO 13849-1.
- SSI or BiSS interface with incremental SinCos tracks with 2048 ppr.
- Certified mechanical mounting + electronic.

Explosion protection

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

Order code Shaft version

8.7053FS2	1	X	4	X	X	X	2	1	XXXX
Type	a	b	c	d	e	f	g	h	i 1)

a Flange

1 = clamping-synchronous flange, IP67, 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 / Power supply

4 = SSI or BiSS + 2048 ppr SinCos / 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']

preferred length see i, e. g.: 0100 = 10 m [32.81']

e Code

B = SSI, Binary

C = BiSS, Binary

G = SSI, Gray

f Resolution 2)

A = 10 bit ST

1 = 11 bit ST

2 = 12 bit ST

3 = 13 bit ST

4 = 14 bit ST

7 = 17 bit ST

g Inputs / Outputs 2)

2 = SET input

h Options

1 = no option

i 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.

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

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Accessory			Order No.
EMC shield terminal	For top-hat rail mounting	8.0000.4G06.0000	
Screw retention	Loctite 243, 5 ml	8.0000.4G05.0000	
Bellows coupling, safety-oriented	You will find an overview of our couplings for Sendix SIL shaft encoders in the accessories section or under www.kuebler.com/accessories .		
Safety modules Safety-M compact / modular	You will find an overview of our systems and components for Functional Safety and the corresponding software in the safety technology section or under www.kuebler.com/safety .		
LED SSI display 570 / 575	Electronic position display up to 32 bit. You will find an overview in the accessories section or under www.kuebler.com/position_display .		

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 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 IP6x
Relevant standards	EN 60079-0: 2009; EN 60079-1: 2007; EN 60079-31: 2009
Explosion protection 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 IP6x
Relevant standards	IEC 60079-0:2007; IEC 60079-1:2007; IEC 60079-31:2008
Notes regarding "Functional Safety"	
These encoders are suitable for use in safety-related systems up to SIL2 acc. to EN 61800-5-2 and PLd to EN ISO 13849-1 in conjunction with controllers or evaluation units, which possess the necessary functionality. Additional functions can be found in the operating manual.	
Safety characteristics	
Classification	PLd / SIL2
System structure	2 channel (Cat. 3 / HFT = 1)
PFH _d value ¹⁾	2.16 x 10 ⁻⁸ h ⁻¹
Proof-test interval	20 years
Relevant standards	EN ISO 13849-1:2008; EN ISO 13849-2:2013; EN 61800-5-2:2007
Electrical characteristics	
Power supply	10 ... 30 V DC
Current consumption (no load)	max. 45 mA
Reverse polarity protection for power supply (+V)	yes
Short circuit proof outputs	yes ²⁾
CE compliant acc. to	EMC guideline 2004/108/EC ATEX guideline 94/9/EC Machinery directive 2006/42/EC
RoHS compliant acc. to	guideline 2011/65/EU
EMC	
Relevant standards	EN 55011 Class B :2009 / A1:2010 EN 61000-6-3 :2007 / A1:2011 EN 61000-6-2 :2005
Mechanical characteristics	
Max. speed	continuous 6 000 min ⁻¹
Starting torque – at 20°C [68°F]	< 0.05 Nm
Moment of inertia	4.0 x 10 ⁻⁶ kgm ²
Load capacity of shaft	radial 80 N axial 40 N
Weight	approx. 1.3 kg [45.86 oz]
Protection acc. to EN 60529	IP67
Working temperature range	-40°C ... +60°C [-40 ... +140°F]
Material	shaft stainless steel flange / housing seawater-resistant Al, type AlSiMgMn (EN AW-6082) (stainless steel on req.) cable PUR
Shock resistance acc. to EN 60068-2-27	500 m/s ² , 11 ms
Vibration resistance acc. to EN 60068-2-6	200 m/s ² , 10 ... 150 Hz

1) The specified value is based on a diagnostic coverage of 90 %, that must be achieved with an encoder evaluation unit.
The encoder evaluation unit must meet at least the requirements for SIL2.

2) Short circuit to 0 V or to output, one channel at a time, power supply correctly applied.

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SSI interface			SinCos interface			
Output driver		RS485 transceiver type		Max. frequency -3dB		400 kHz
Permissible load / channel		max. 20 mA		Signal level		1 Vpp (±10 %)
Signal level		HIGH	typ 3.8 V	Short circuit proof		yes
		LOW at I _{Load} = 20 mA	typ 1.3 V	Pulse rate		2048 ppr
Singleturn resolution		10...14 bit and 17 bit ¹⁾				
Number of revolutions		4096 (12 bit)				
Code		Binary or Gray				
SSI clock rate		50 kHz ... 2 MHz				
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.						
Data refresh rate		resolution ≤ 14 bit	≤ 1 µs			
		resolution ≥ 15 bit	4 µs			
Status and parity bit		on request				
BiSS interface						
Singleturn resolution		10 ... 14 bit and 17 bit ¹⁾				
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		≤ 1 µs				
Note: – Bidirectional, factory programmable parameters are: resolution, code, direction, alarms and warnings – CRC data verification						

SET input			
Input		HIGH active	
Input type		comparator	
Signal level		HIGH	min. 60 % of +V
(+V = Power supply)			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.			
Power-ON delay			
After Power-ON, the device requires a time of approximately 150 ms before valid data can be read.			

Terminal assignment

Interface	Type of connection	Features	Cable (isolate unused wires individually before initial start-up)												
4	1, 2, A, B	SET	Signal:	0 V	+V	C+	C-	D+	D-	SET	A	$\bar{A}$	B	$\bar{B}$	$\perp$
			Cable marking:	6	1	2	3	4	5	11	7	8	9	10	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. The current position becomes defined as position zero.

A, $\bar{A}$: Cosine signal

B, $\bar{B}$: Sine signal

$\perp$: Protective earth

¹⁾ Other options on request.

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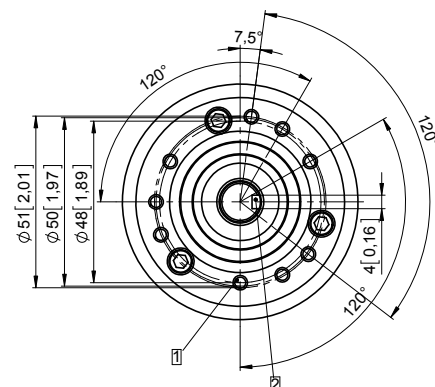
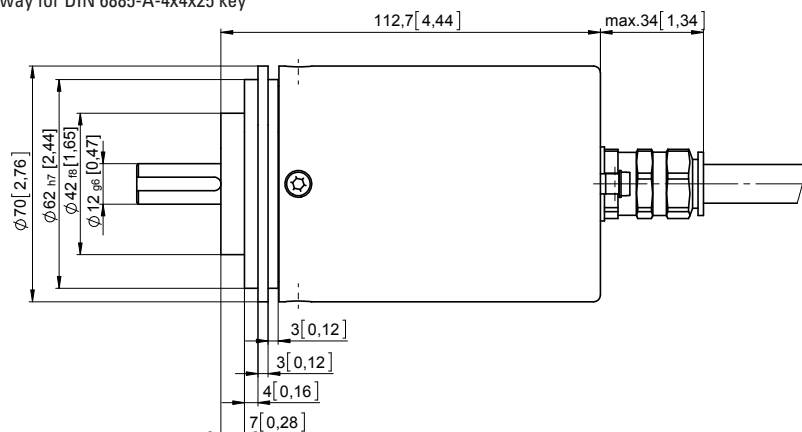
SSI/BiSS + SinCos

Dimensions

Dimensions in mm [inch]

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

- 1 6 x M4, 10 [0.39] deep
- 2 Keyway for DIN 6885-A-4x4x25 key



Clamping-synchronous flange, $\varnothing$ 70 [2.76]
Shaft type 2 with radial cable outlet

- 1 6 x M4, 10 [0.39] deep

