

# Incremental encoders

<b>Standard</b> sine wave output, SIL2/PLd, optical	<b>Sendix 5814FS2 / 5834FS2 (shaft / hollow shaft)</b>	<b>SinCos</b>
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The incremental encoders 5814FS2 and 5834FS2 of the Sendix family are suited for use in safety-related applications up to SIL2 according to EN 61800-5-2 or PLd to EN ISO 13849-1.

These encoders are particularly suited for applications in the field of safe drive technology.



Safety-Lock™



High rotational speed



Temperature range  
-40°...+90°C



High protection level



High shaft load capacity



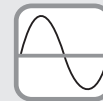
Shock / vibration resistant



Magnetic field proof



Reverse polarity protection



SinCos



Optical sensor

## Functional Safety

- Encoder with individual certificate from 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.
- With incremental SinCos tracks.
- Certified mechanical mounting + electronic.

## Flexible

- Shaft and hollow shaft versions.
- Cable and connector variants.
- Various mounting options available.

**Order code** 8.5814FS2 . XXXXX . XXXX  
**Shaft version** Type a b c d e

### a Flange

- 1 = clamping flange, IP65, ø 58 mm [2.28"]
- 3 = clamping flange, IP67, ø 58 mm [2.28"]

### b Shaft (ø x L)

- 2 = 10 x 20 mm [0.39 x 0.79"], with flat
- A = 10 x 20 mm [0.39 x 0.79"], with feather key

### c Output circuit / power supply

- 1 = SinCos / 5 V DC
- 2 = SinCos / 10 ... 30 V DC

### d Type of connection

- 1 = axial cable, 1 m [3.28'] PVC
- A = axial cable, special length PVC \*)
- 2 = radial cable, 1 m [3.28'] PVC
- B = radial cable, special length PVC \*)
- 3 = axial M23 connector, 12-pin
- 4 = radial M23 connector, 12-pin
- 5 = axial M12 connector, 8-pin
- 6 = radial M12 connector, 8-pin

\*) Available special lengths (connection types A, B):  
 2, 3, 5, 8, 10, 15 m [6.56, 9.84, 16.40, 26.25, 32.80, 49.21']  
 order code expansion .XXXX = length in dm  
 ex.: 8.5814FS2.122A.2048.0030 (for cable length 3 m)

### e Pulse rate

- 1024, 2048

Optional on request  
 - Ex 2/22 <sup>1)</sup>

1) For the cable connection type, cable material PUR.

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<b>Order code</b> <b>Hollow shaft</b>	<b>8.5834FS2</b> Type	<b>. X X X X . X X X X</b> a b c d e
<b>a Flange</b> 9 = with torque stop, flexible, IP65 J = with torque stop, flexible, IP67 A = with torque stop set, rigid, IP65 K = with torque stop set, rigid, IP67 B = with stator coupling, IP65, ø 63 mm [2.48"] L = with stator coupling, IP67, ø 63 mm [2.48"]	<b>d Type of connection</b> 2 = radial cable, 1 m [3.28'] PVC B = radial cable, special length PVC *) E = tangential cable, 1 m [3.28'] PVC F = tangential cable, special length PVC *) 4 = radial M23 connector, 12-pin 6 = radial M12 connector, 8-pin  *) Available special lengths (connection types B, F): 2, 3, 5, 8, 10, 15 m [6.56, 9.84, 16.40, 26.25, 32.80, 49.21'] order code expansion .XXXX = length in dm ex.: 8.5834FS2.B42B.2048.0030 (for cable length 3 m)	<b>e Pulse rate</b> 1024, 2048  <i>Optional on request</i> - Ex 2/22 (not for connection type E + F) <sup>1)</sup>
<b>b Through hollow shaft</b> 3 = ø 10 mm [0.39"] 4 = ø 12 mm [0.47"] 5 = ø 14 mm [0.55"] <i>Tapered shaft</i> K = ø 10 mm [0.39"]		
<b>c Output circuit / power supply</b> 1 = SinCos / 5 V DC 2 = SinCos / 10 ... 30 V DC		

Accessories		Order no.
<b>EMC shield terminal</b>	for top-hat rail mounting	<b>8.0000.4G06.0312</b>
<b>Screw retention</b>	Loctite 243, 5 ml	<b>8.0000.4G05.0000</b>
<b>Bellows coupling, safety-oriented</b>	You will find an overview of our couplings for Sendix shaft encoders in the accessories section or under <a href="http://kuebler.com/accessories">kuebler.com/accessories</a> .	
<b>Safety modules Safety-M compact</b>	You will find an overview of our systems and components for Functional Safety and the corresponding software in the safety technology section or under <a href="http://kuebler.com/safety">kuebler.com/safety</a> .	

Further accessories can be found in the accessories section or in the accessories area of our website at: [kuebler.com/accessories](http://kuebler.com/accessories).

Connection technology		Order no.
<b>Cordset, pre-assembled</b>	M12 female connector with coupling nut, 8-pin 2 m [6.56'] PVC cable <sup>2)</sup>	<b>05.00.6041.8211.002M</b>
	M23 female connector with coupling nut, 12-pin 2 m [6.56'] PVC cable <sup>2)</sup>	<b>8.0000.6901.0002</b>
<b>Connector, self-assembly (straight)</b>	M12 female connector with coupling nut, 8-pin	<b>05.CMB 8181-0</b>
	M23 female connector with coupling nut, 12-pin	<b>8.0000.5012.0000</b>

Additional connectors can be found in the connection technology section or in the connection technology area of our website at: [kuebler.com/connection\\_technology](http://kuebler.com/connection_technology).

Technical data	
<b>Notes regarding "Functional Safety"</b>	<b>Safety characteristics</b>
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.	<b>Classification</b> PLd / SIL2
	<b>System structure</b> 2 channel (Cat. 3)
	<b>PFH<sub>d</sub> value <sup>3)</sup></b> 2.16 x 10 <sup>-8</sup> h <sup>-1</sup>
	<b>Mission time / Proof test interval</b> 20 years
	<b>Relevant standards</b> EN ISO 13849-1:2015; EN ISO 13849-2:2012; EN 61800-5-2:2007

1) For the cable connection type, cable material PUR.  
2) Other lengths available.  
3) 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.

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Mechanical characteristics		
<b>Maximum speed, shaft version</b>	up to 70°C [158°F]	12000 min <sup>-1</sup> , 10000 min <sup>-1</sup> (continuous)
	up to T <sub>max</sub>	8000 min <sup>-1</sup> , 5000 min <sup>-1</sup> (continuous)
<b>Maximum speed, hollow shaft version</b>	up to 70°C [158°F]	9000 min <sup>-1</sup> , 6000 min <sup>-1</sup> (continuous)
	up to T <sub>max</sub>	6000 min <sup>-1</sup> , 3000 min <sup>-1</sup> (continuous)
<b>Starting torque – at 20°C [68°F]</b>	shaft version	< 0.01 Nm
	hollow shaft version	< 0.03 Nm
<b>Mass moment of inertia</b>	shaft version	4.0 x 10 <sup>-6</sup> kgm <sup>2</sup>
	hollow shaft version	7.0 x 10 <sup>-6</sup> kgm <sup>2</sup>
<b>Insertion depth for shaft</b>	hollow shaft version	min. 34 mm [1.34"]
<b>Load capacity of shaft</b>	radial	80 N
	axial	40 N
<b>Weight</b>		approx. 0.45 kg [15.87 oz]
<b>Protection acc. to EN 60529</b>		IP65, IP67
<b>Working temperature range</b>		-40°C ... +90°C [-40°F ... +194°F] <sup>1)</sup>
<b>Materials</b>	shaft / hollow shaft	stainless steel
	flange	aluminum
	housing	zinc die-cast
	cable	PVC (PUR for Ex 2/22)
<b>Shock resistance acc. to EN 60068-2-27</b>		500 m/s <sup>2</sup> , 11 ms
<b>Vibration resistance acc. to EN 60068-2-6</b>		200 m/s <sup>2</sup> , 5 ... 2000 Hz

Electrical characteristics	
<b>Power supply</b>	5 V DC (±5 %) or 10 ... 30 V DC
<b>Power consumption (no load)</b>	5 V DC max. 70 mA 10 ... 30 V DC max. 45 mA
<b>Reverse polarity protection of the power supply</b>	yes
<b>Short circuit proof outputs</b>	yes <sup>2)</sup>
<b>UL approval</b>	file no. E224618
<b>CE compliant acc. to</b>	EMC guideline 2014/30/EU Machinery directive 2006/42/EC RoHS guideline 2011/65/EU

EMC	
<b>Relevant standards</b>	EN 55011 class B:2009 / A1:2010 EN 61326-1:2013 EN 61326-3-1:2008

SinCos interface	
<b>Max. frequency -3dB</b>	400 kHz
<b>Signal level</b>	1 V <sub>pp</sub> (±10 %)
<b>Short circuit proof</b>	yes <sup>2)</sup>
<b>Pulse rate</b>	1024 / 2048 ppr

## Terminal assignment

Output circuit	Type of connection	Cable (isolate unused cores individually before initial start-up)							
1, 2	1, 2, A, B, E, F	Signal:	0 V	+V	A	$\bar{A}$	B	$\bar{B}$	$\perp$
		Core color:	WH	BN	GN	YE	GY	PK	shield

Output circuit	Type of connection	M23 connector, 12-pin							
1, 2	3, 4	Signal:	0 V	+V	A	$\bar{A}$	B	$\bar{B}$	$\perp$
		Pin:	10	12	5	6	8	1	PH <sup>3)</sup>

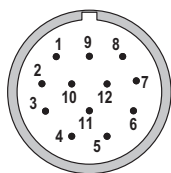
Output circuit	Type of connection	M12 connector, 8-pin							
1, 2	5, 6	Signal:	0 V	+V	A	$\bar{A}$	B	$\bar{B}$	$\perp$
		Pin:	1	2	3	4	5	6	PH <sup>3)</sup>

- +V: Encoder power supply +V DC
- 0 V: Encoder power supply ground GND (0 V)
- A,  $\bar{A}$ : Cosine signal
- B,  $\bar{B}$ : Sine signal
- PH  $\perp$ : Plug connector housing (shield)

## Top view of mating side, male contact base



M12 connector, 8-pin



M23 connector, 12-pin

1) Cable version: -30°C ... +90°C [-22°F ... +194°F] fixed installation.  
 2) Short circuit to 0 V or to output, one channel at a time, power supply correctly applied.  
 3) PH = shield is attached to connector housing.

# Incremental encoders

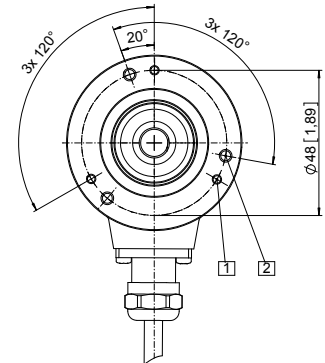
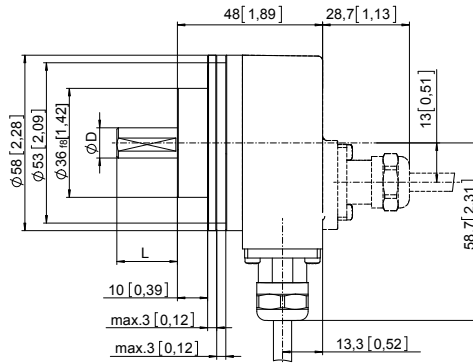
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## Dimensions shaft version

Dimensions in mm [inch]

**Clamping flange,  $\varnothing$  58 [2.28]**  
**Flange type 1 with shaft type 2**  
 (drawing with cable)

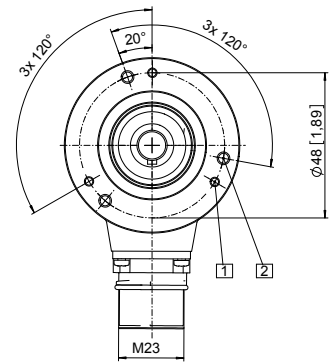
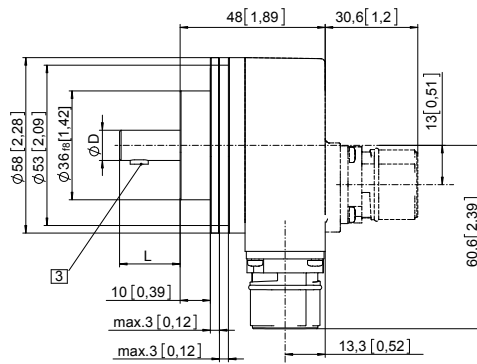
- 1 3 x M3, 6 [0.24] deep
- 2 3 x M4, 8 [0.32] deep



D	Fit	L
10 [0.39]	f7	20 [0.79]

**Clamping flange,  $\varnothing$  58 [2.28]**  
**Flange type 1 with shaft type A**  
 (drawing with M23 connector)

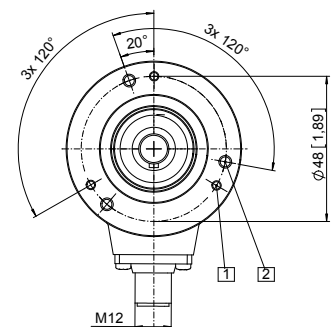
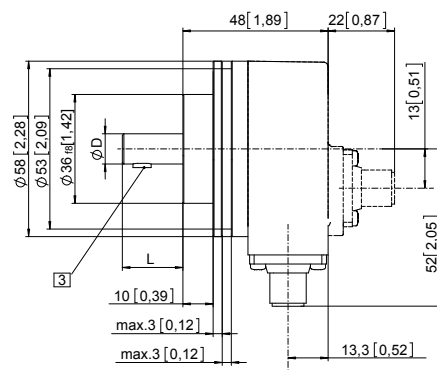
- 1 3 x M3, 6 [0.24] deep
- 2 3 x M4, 8 [0.32] deep
- 3 Feather key DIN 6885 - A - 3x3x6



D	Fit	L
10 [0.39]	f7	20 [0.79]

(drawing with M12 connector)

- 1 3 x M3, 6 [0.24] deep
- 2 3 x M4, 8 [0.32] deep
- 3 Feather key DIN 6885 - A - 3x3x6



D	Fit	L
10 [0.39]	f7	20 [0.79]



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## Dimensions hollow shaft version

Dimensions in mm [inch]

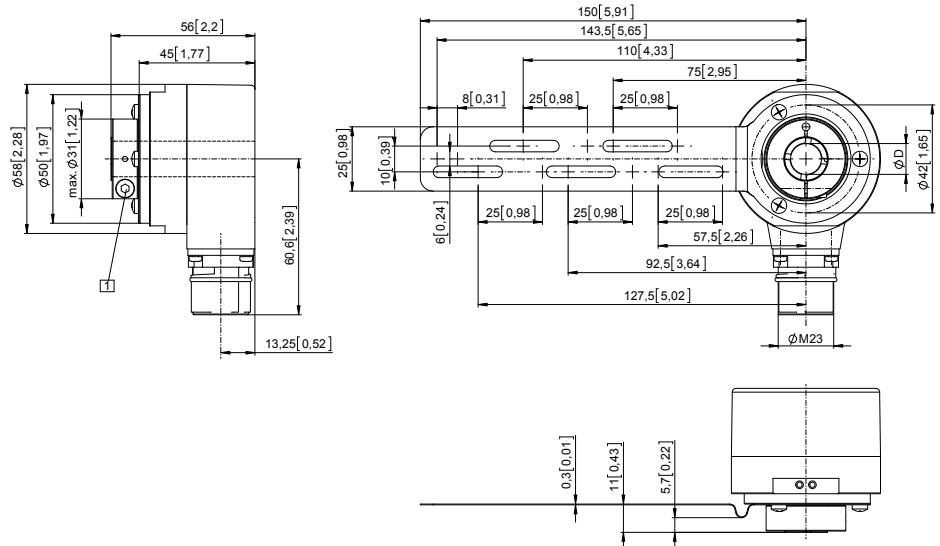
### Flange with torque stop, flexible

#### Flange type 9

#### Through hollow shaft

(drawing with M23 connector)

- 1 SW 3, recommended torque for the clamping ring 2.5 Nm



D	Fit
10 [0.39]	H7
12 [0.47]	H7
14 [0.55]	H7

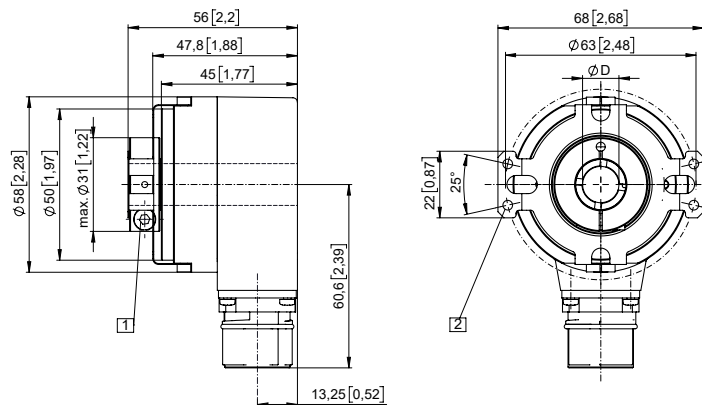
### Flange with stator coupling, $\phi 63$ [2.48]

#### Flange type B

#### Through hollow shaft

(drawing with M23 connector)

- 1 SW 3, recommended torque for the clamping ring 2.5 Nm
- 2 For (4x) M3 screw



D	Fit
10 [0.39]	H7
12 [0.47]	H7
14 [0.55]	H7

### Flange with stator coupling, $\phi 63$ [2.48]

#### Flange type B

#### Tapered shaft

(drawing with tangential cable outlet)

- 1 For (4x) M3 screw
- 2 Recommended torque for (SW 4) tightening screw 3<sup>+0.5</sup> Nm

