

Absolute encoders – singleturn

**Standard
optical**

Sendix S5858FS3 / S5878FS3 (shaft / hollow shaft)

Safety over EtherCAT (FSoE)



The optical absolute Sendix S58 Safety over EtherCAT encoders are based on the new Kübler Industrial Ethernet encoder platform and are therefore already designed today for future Industry 4.0 concepts.

They are characterized by high-resolution position values, gear factors, variable integration times and many other functionalities and, in combination with Cyber Security, are suitable for the flexible requirements of state-of-the-art industrial environments.

As certified SIL3 / PLe encoders with redundant design and EtherCAT interface, they support the EtherCAT–FSoE profile and are predestined for safety applications.



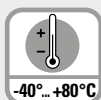
Safety over
EtherCAT®



Safety-Lock™



High rotational
speed



Temperature
range



High protection
level



High shaft load
capacity



Shock / vibration
resistant



Magnetic field
proof



Reverse polarity
protection



Optical sensor

Reliable and safe

- **Robust**
Sturdy bearing construction in Safety-Lock™ Design for resistance against vibration and installation errors.
- **High resolution**
- Singleturn 15 bit (safe) or 24 bit (non safe).
- **Safe**
- SIL 3, performance level PLe, safety category Cat. 3.
- **100 % future-proof**
- FoE (File over EtherCAT) without required web server.
- Cyber Security / high system availability, protection against misuse (in accordance with IEC 62443).

Latest EtherCAT functionality

- Can be implemented in networks for hard real-time requirements with clock cycles of up to 350 µs (non-safe) thanks to DC mode support.
- Ideal for highly synchronous applications, such as axis synchronization.
- Equipped for a wide range of applications thanks to versatile encoder functions such as transmission factors (safe/non-safe) or limit value switches etc.

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Order code Shaft version		8.S5858FS3 Type		.X.X.B.N.B131 a b c d e f	
a Flange 1 = clamping flange, IP65 ø 58 mm [2.28"] 3 = clamping flange, IP67 ø 58 mm [2.28"] 2 = synchro flange, IP65 ø 58 mm [2.28"] 4 = synchro flange, IP67 ø 58 mm [2.28"] 5 = square flange, IP65 □ 63.5 mm [2.5"] 7 = square flange, IP67 □ 63.5 mm [2.5"]		c Interface / Supply voltage B = EtherCAT / 10 ... 30 V DC		d Type of connection N = 3 x axial M12 connector, 4-pin	
b Shaft (ø x L), with flat 2 = 10 x 20 mm [0.39 x 0.79"] 5 = 12 x 20 mm [0.47 x 0.79"] 4 = 3/8" x 7/8" Shaft (ø x L), with feather key A = 10 x 20 mm [0.39 x 0.79"] (feather key DIN 6885 A-3x3x10) D = 12 x 20 mm [0.47 x 0.79"] (feather key DIN 6885 A-4x4x10) C = 3/8" x 7/8"(feather key DIN 6885 A-3x3x10)		e Fieldbus profile B1= EtherCAT – FSoE		f Cyber Security 3 = with Cyber Security	
		Optional on request - Ex 2/22 (only for variants with IP67) - surface protection salt spray tested			

Order code Hollow shaft		8.S5878FS3 Type		.X.X.B.N.B131 a b c d e f	
a Flange 1 = with torque stop FS, flexible, IP65 2 = with torque stop FS, flexible, IP67 5 = with stator coupling FS, ø 63 mm [2.48"] , IP65 6 = with stator coupling FS, ø 63 mm [2.48"] , IP67 7 = with torque stop FS, rigid, IP65 (incl. torque pin FS) 8 = with torque stop FS, rigid, IP67 (incl. torque pin FS)		c Interface / Supply voltage B = EtherCAT / 10 ... 30 V DC		d Type of connection N = 3 x axial M12 connector, 4-pin	
b Blind hollow shaft, with feather keyway (insertion depth max. 30 mm [1.18"]) A = ø 10 mm [0.39"] B = ø 12 mm [0.47"] C = ø 14 mm [0.55"] D = ø 15 mm [0.59"] E = ø 3/8" F = ø 1/2"		e Fieldbus profile B1= EtherCAT – FSoE		f Cyber Security 3 = with Cyber Security	
		Optional on request - Ex 2/22 (only for variants with IP67) - surface protection salt spray tested			

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Mounting accessory for shaft encoders			Order no.
Bellows coupling FS	bellows coupling FS ø 25 mm [0.98"] for shaft 10 mm [0.39"]		8.0000.15FS.1010
	bellows coupling FS ø 25 mm [0.98"] for shaft 12 mm [0.47"]		8.0000.15FS.1212
Accessories			Order no.
Screw retention	Loctite 243, 5 ml		8.0000.4G05.0000
Cables and connectors			Order no.
Preassembled cables	M12 male connector with external thread, 4-pin, D coded, straight single-ended 2 m [6.56'] PUR cable	port 1 + port 2	05.00.6031.4411.002M
	M12 male connector with external thread, 4-pin, D coded, right-angle single-ended 2 m [6.56'] PUR cable	port 1 + port 2	05.00.6031.4511.002M
	M12 female connector with coupling nut, 4-pin, A coded, straight single-ended 2 m [6.56'] PUR cable	power supply	05.00.6061.6211.002M
	M12 female connector with coupling nut, 4-pin, A coded, right-angle single-ended 2 m [6.56'] PUR cable	power supply	05.00.6061.6311.002M
Connectors	M12 male connector with external thread, 4-pin, D coded, straight (metal)	port 1 + port 2	05.WASCSY4S
	M12 male connector with external thread, 4-pin, D coded, right-angle (metal)	port 1 + port 2	8.0000.5128.0000
	M12 female connector with coupling nut, 4-pin, A coded, straight (plastic)	power supply	05.B8141-0
	M12 female connector with coupling nut, 4-pin, A coded, right-angle (plastic)	power supply	05.B8241-0

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

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

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Technical data

Notes regarding “Functional Safety”
These encoders are suitable for use in safety-related systems up to SIL3 acc. to EN 61508 / EN 61800-5-2 / EN IEC 62061 and PLe 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	PLe / SIL3
System structure	2 channel (Kat. 3)
PFH _d value ¹⁾	9,54 x 10 ⁻¹⁰ h ⁻¹
Mission time / Proof test interval	20 years
Relevant standards	
Safety Integrity Level (SIL) acc. to	EN 61508 EN 61800-5-2 EN IEC 62061
Performance Level (PL) acc. to	EN ISO 13849-1

Mechanical characteristics		
Max. speed		9000 min ⁻¹ (short-term – 10 min) 6000 min ⁻¹ (continuous)
Starting torque at 20 °C [68 °F]		< 0.01 Nm
Moment of inertia		
	shaft version	3.0 x 10 ⁻⁶ kgm ²
	blind hollow shaft version	6.0 x 10 ⁻⁶ kgm ²
Load capacity of shaft		
	radial	80 N
	axial	40 N
Weight		approx. 0.45 kg [15.87 oz]
Protection acc. to EN 60529		IP65, IP67
Ambient temperature		-40 °C ... +80 °C [-40 °F ... +176 °F]
Material		
	shaft/hollow shaft	stainless steel
	flange	aluminum
	housing	aluminum
Shock resistance acc. EN 60068-2-27		1000 m/s ² , 6 ms
Vibration resistance acc. EN 60068-2-6		
Frequency range		5 Hz ... 2000 Hz
Amplitude		5 ... 8,7 Hz ±0,35 mm
Acceleration		8,7 ... 200 Hz 30 m/s ² , (3 g)
	200 ... 2000 Hz	220 m/s ² , (22 g)

Electrical characteristics	
Supply voltage	10 ... 30 V DC
Power consumption (no load)	max. 250 mA
Reverse polarity protection of the supply voltage (+V)	yes
Smallest safe measuring step	158,4 arcsec (0,044° / 4 increments)
Lowest safe speed	8 rpm ($\sigma_v < 1 \%$)

Approvals	
UL compliant in accordance with	File no. E224618
CE compliant in accordance with	
EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU
ATEX Directive	2014/34/EU (for Ex 2/22 variants)
Machinery Directive	2006/42/EG
Cyber Security	
the encoder complies with the standards	IEC 62443-4-1 and IEC 62443-4-2 according to Security Level 1

1) The specified value is based on a diagnostic coverage of 99 %, that must be achieved with an encoder evaluation unit.
The encoder evaluation unit must meet at least the requirements for SIL3.

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Interface characteristics EtherCAT

Resolution	EtherCAT FSoE characteristics
Resolution Singleturn (MUR) scalable safe 1 ... 32 768 (15 bit) scalable non-safe 1 ... 16 777 216 (24 bit) default 8 192 (13 bit)	• FSoE • CoE • FoE • Free Run Mode • DC Mode - Non Safe up to 350 µs • Hot Connect
Adjustable parameters	Process data
Safe and non-safe in each case: • Preset • Counting direction • Resolution per revolution - MUR • Total resolution - TMR • Unit Speed • Speed integration time • Gear factor • Limit value switch	• Position • Speed • Acceleration • Working range channel 1 / channel 2 • Status • Failure • Warnings

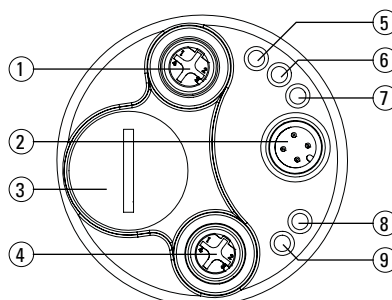
Terminal assignment bus

Interface	Type of connection	Function	M12 connector, 4-pin					
B	N (3 x M12 connector)	Bus Port 1 Port OUT	Signal:	Transmit data+	Receive data+	Transmit data -	Receive data -	 D coded
			Abbreviation:	TxD+	RxD+	TxD-	RxD-	
			Pin:	1	2	3	4	
		Power supply	Signal:	Voltage +	–	Voltage –	–	
			Abbreviation:	+ V	–	0 V	–	
			Pin:	1	2	3	4	
		Bus Port 2 Port IN	Signal:	Transmit data+	Receive data+	Transmit data -	Receive data -	 D coded
			Abbreviation:	TxD+	RxD+	TxD-	RxD-	
			Pin:	1	2	3	4	

Rear side connections and display elements

①	EtherCAT – Port OUT	
②	Supply voltage	
③	Cover screw	
④	EtherCAT – Port IN	
⑤	L/A - Link Activity	flashes yellow when connected
⑥	ERR - Error	displays network errors *)
⑦	RUN	EtherCAT status *)
⑧	ENC	shows status of encoder *)
⑨	L/A - Link Activity	flashes yellow when connected

*) see manual



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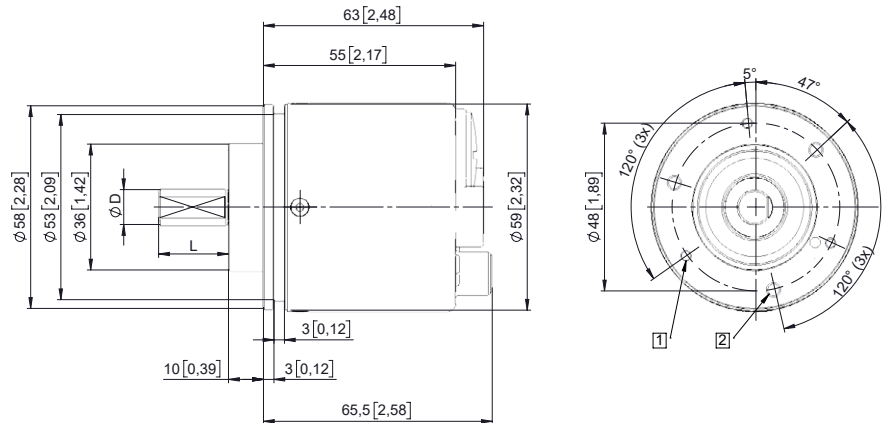
Dimensions shaft version

Dimensions in mm [inch]

Clamping flange, ø 58 [2.28]

Flange type 1 + 3

- 1 3 x M3, 6 [0.24] deep
- 2 3 x M4, 8 [0.31] deep

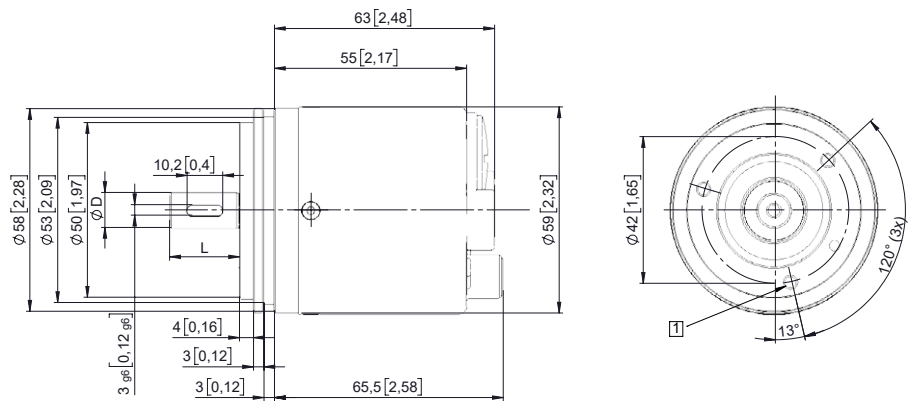


D	Fit	L
10 [0.39]	h7	20 [0.79]
12 [0.47]	h7	20 [0.79]
3/8"	h7	7/8"

Synchro flange, ø 58 [2.28]

Flange type 2 + 4

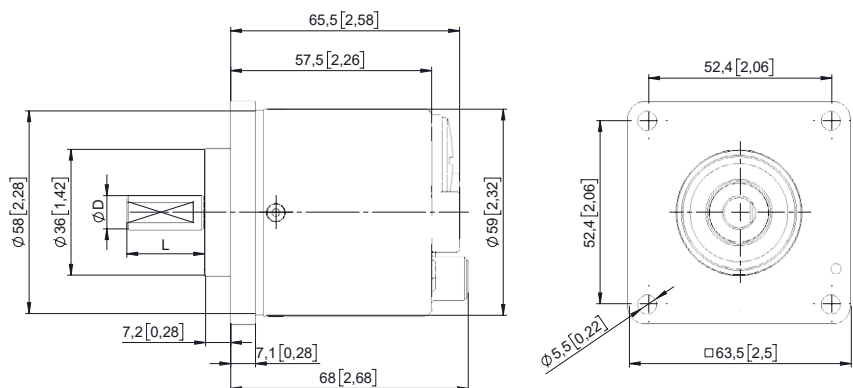
- 1 3 x M4, 8 [0.31] deep



D	Fit	L
10 [0.39]	h7	20 [0.79]
12 [0.47]	h7	20 [0.79]
3/8"	h7	7/8"

Square flange, □ 63.5 [2.5]

Flange type 5 + 7



D	Fit	L
10 [0.39]	h7	20 [0.79]
12 [0.47]	h7	20 [0.79]
3/8"	h7	7/8"

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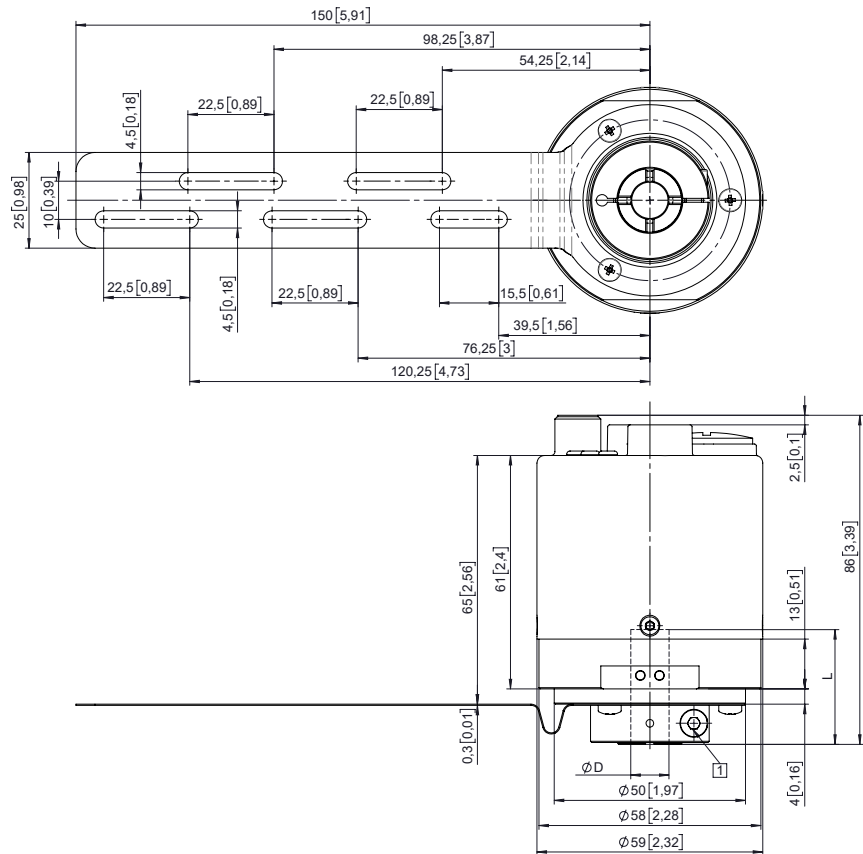
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Dimensions hollow shaft version

Dimensions in mm [inch]

Flange with torque stop FS, flexible Flange type 1 + 2

- 1 Recommended torque for the clamping ring 2.5 Nm

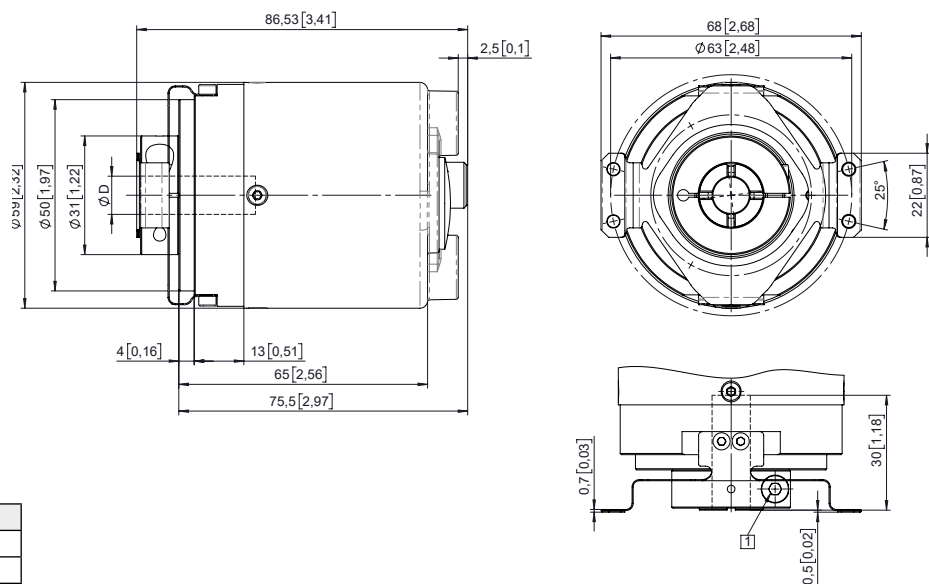


D	Fit	L
10 [0.39]	H7	30 [1.18]
12 [0.47]	H7	30 [1.18]
14 [0.55]	H7	30 [1.18]
15 [0.59]	H7	30 [1.18]
3/8"	H7	30 [1.18]
1/2"	H7	30 [1.18]

L = insertion depth max. blind hollow shaft

Flange with stator coupling FS, ø 63 [2.48] Flange type 5 + 6

- 1 Recommended torque for the clamping ring 2.5 Nm



D	Fit	L
10 [0.39]	H7	30 [1.18]
12 [0.47]	H7	30 [1.18]
14 [0.55]	H7	30 [1.18]
15 [0.59]	H7	30 [1.18]
3/8"	H7	30 [1.18]
1/2"	H7	30 [1.18]

L = insertion depth max. blind hollow shaft

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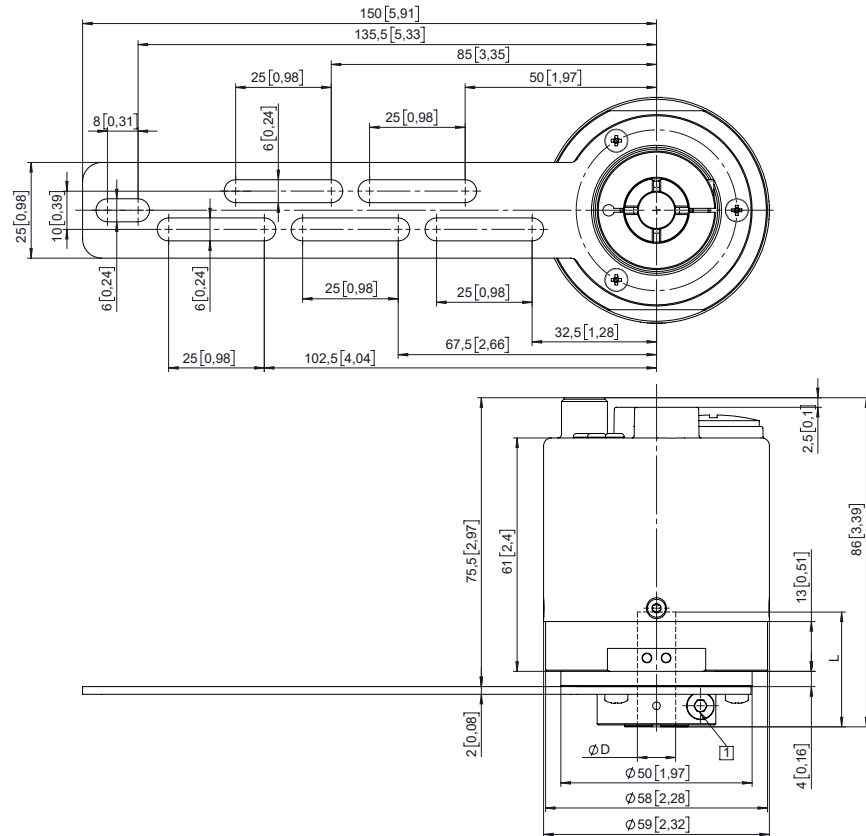
Safety over EtherCAT (FSoE)

Dimensions hollow shaft version

Dimensions in mm [inch]

**Flange with torque stop FS, rigid
Flange type 7 + 8**

1 Recommended torque for the
clamping ring 2.5 Nm



D	Fit	L
10 [0.39]	H7	30 [1.18]
12 [0.47]	H7	30 [1.18]
14 [0.55]	H7	30 [1.18]
15 [0.59]	H7	30 [1.18]
3/8"	H7	30 [1.18]
1/2"	H7	30 [1.18]

L = insertion depth max. blind hollow shaft

**Torque pin with rectangular sleeve with
M4 thread
(included in scope of delivery)**

