

Encoders for Functional Safety

Absolute Singleturn Encoders Sendix absolute 5853 SIL / 5873 SIL (Shaft / Hollow shaft) Functional Safety

Notes regarding "Functional Safety"

These encoders are suitable for use in safety-related systems up to SIL3 to DIN EN ISO 61800-5-2 and PLe to DIN EN ISO 13849 in conjunction with controllers or evaluation units, which possess the necessary functionality. Additional functions can be found in the operating manual.

Mechanical characteristics

Max. speed, shaft version	
without shaft seal (IP 65) up to 70°C	12 000 min ⁻¹ , 10 000 min ⁻¹ (continuous)
without shaft seal (IP 65) up to T _{max}	8 000 min ⁻¹ , 5 000 min ⁻¹ (continuous)
with shaft seal (IP 67) up to 70°C	11 000 min ⁻¹ , 9 000 min ⁻¹ (continuous)
with shaft seal (IP 67) up to T _{max}	8 000 min ⁻¹ , 5 000 min ⁻¹ (continuous)
Max. speed, hollow shaft version	
without shaft seal (IP 65) up to 70°C	9 000 min ⁻¹ , 6 000 min ⁻¹ (continuous)
without shaft seal (IP 65) up to T _{max}	6 000 min ⁻¹ , 3 000 min ⁻¹ (continuous)
with shaft seal (IP 67) up to 70°C	8 000 min ⁻¹ , 4 000 min ⁻¹ (continuous)
with shaft seal (IP 67) up to T _{max}	4 000 min ⁻¹ , 2 000 min ⁻¹ (continuous)
Starting torque, shaft version	
without shaft seal (IP65)	< 0,01 Nm
with shaft seal (IP67)	< 0,05 Nm
Starting torque, hollow shaft version	
without shaft seal (IP65)	< 0,03 Nm
Moment of inertia	
Shaft version	4,0 x 10 ⁻⁶ kgm ²
Hollow shaft version	7,0 x 10 ⁻⁶ kgm ²
Load capacity of shaft	radial / axial 80 N / 40 N
Weight	approx. 0,45 kg
Protection EN 60 529	housing side IP 67 shaft side IP 65, opt. IP 67
Working temperature range	-40°C ... +90°C ¹⁾
Materials	shaft/hollow shaft stainless steel flange aluminium housing zinc die-cast housing cable PVC
Shock resistance acc. DIN-IEC 68-2-27	> 2500 m/s ² , 6 ms
Vibration resistance acc. DIN-IEC 68-2-6	> 100 m/s ² , 55 ... 2000 Hz

Electrical characteristics

Supply voltage	5 V DC ± 5% or 10 ... 30 V DC
Current consumption	5 V DC max. 75 mA (w/o output load) 24 V DC max. 45 mA
Reverse polarity protection of the power supply (Ub)	yes
Conforms to CE requirements acc. to	EN 61000-6-2, EN 61000-6-4, EN 61000-6-3
RoHS compliant acc. to	EG-Richtlinie 2002/95/EG

General Interface characteristics

Output driver	RS 485 transceiver type
Permissible load / channel	max. ± 20 mA
Signal level	high typ 3,8 V low at I _{Load} = 20 mA typ 1,3 V
Short circuit proof outputs	yes ²⁾

1) Cable version: -30 °C ... +90°C
2) Short circuit to 0V or to output, one channel at a time, supply voltage correctly applied
3) Other options upon request

SSI Interface

Singleturn resolution	10 ... 14 bits and 17 bit ³⁾	
Code	Binary or Gray	
SSI clock rate	≤ 14 bits	50 kHz ... 2 MHz
	≥ 15 bits	50 kHz ... 125 kHz
Monoflop time	≤ 15 µs	
Note: If the clock starts cycling within the monoflop time, a second data transfer starts with the same data. If the clock starts cycling after the monoflop time, the data transfer starts with the new values. The update rate is dependent on the clock speed, data length and monoflop-time.		
Data refresh rate	≤ 14 bits	< 1 µs
	15 ... 17 bits	4 µs
Status and Parity bits	optional on request	

Output Sine / Cosine (A / B) 2048 ppr

Max. frequency -3dB	400 kHz
Signal level	1 V _{pp} (± 20%)
Short circuit proof	yes

SET input or SET button

Input	active high	
Input type:	comparator	
Signal level	high	min: 60 % of V ₊ , max: V ₊
	low	max: 25 % of V ₊ (Supply voltage)
Input current	< 0,5 mA	
Min. pulse duration (SET)	10 ms	
Timeout after SET signal	14 ms	
Reaction Time (DIR input)	1 ms	

The encoder can be set to zero at any position by means of a HIGH signal on the SET input or by pressing the optional SET button (with a pencil, ball-point pen or similar). Other preset values can be factory-programmed. The SET input has a signal delay time of approx. 1 ms. Once the SET function has been triggered, the encoder requires an internal processing time of approx. 15 ms before the new position data can be read. During this time the LED is ON.

DIR input

A HIGH signal switches the direction of rotation from the default CW to CCW. This function can also be factory-programmed to be inverted. If DIR is changed when the device is already switched on, then this will be interpreted as an error. The LED will come ON and the status output will switch to LOW.

Power-on delay

After Power-ON the encoder requires a time of approx. 150 ms before valid data can be read.

LED

The optional LED (red) serves to display various alarm or error messages. In normal operation the LED is OFF.
If the LED is ON this indicates:
- Sensor error, singleturn or multiturn (soiling, glass breakage etc.)
- LED error, failure or ageing
- Over- or under-voltage
- Over- or under-temperature

In the SSI mode, the fault indication can only be reset by switching off the power-supply to the device.

Encoders for Functional Safety

Absolute Singleturn Encoders **Sendix absolute** **5853 SIL / 5873 SIL (Shaft / Hollow shaft)** **Functional Safety**

Terminal assignment

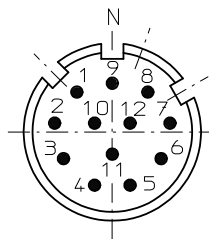
for output circuit 3 or 4 and type of connection 1, 2, 3, 4 or E (2 control inputs, Sine/Cosine)

Signal:	GND	+V	+C	-C	+D	-D	SET	DIR	A	A inv	B	B inv	PE
Cable colour:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY-PK	RD-BU	Shield
M23 connector:	1	2	3	4	5	6	7	8	9	10	11	12	PH

- +V: Encoder Power Supply +V DC
- GND: Encoder Power Supply Ground (0V)
- +C, -C: Clock signal
- +D, -D: Data signal
- SET: Set input. The current position is set to zero
- DIR: Direction input: If this input is active, the output values are counted backwards (decrease) when the shaft is turning clockwise.

- Stat: Status output
- PE: Protective earth
- PH: Plug connector housing (shield)
- A, A inv: Sine output (incremental)
- B, B inv: Cosine output (incremental)

Top view of mating side, male contact base: 12-pin M23 connector



Corresponding mating connector: 8.0000.5012.0000

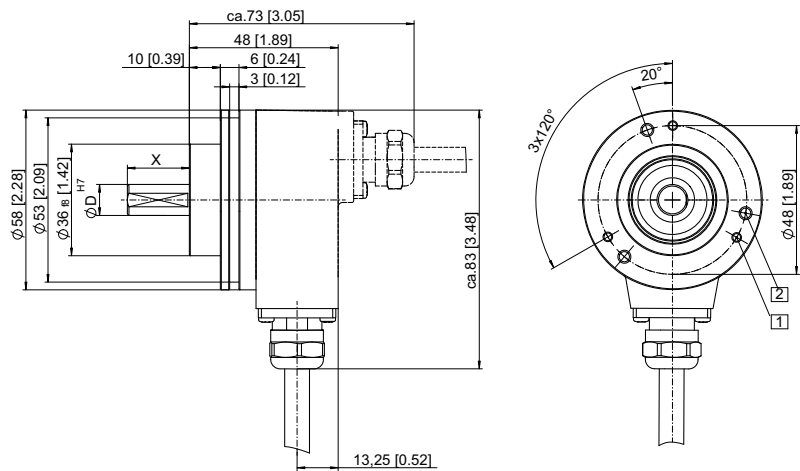
Encoders for Functional Safety

Absolute Singleturn Encoders **Sendix absolute** **5853 SIL / 5873 SIL (Shaft / Hollow shaft)** **Functional Safety**

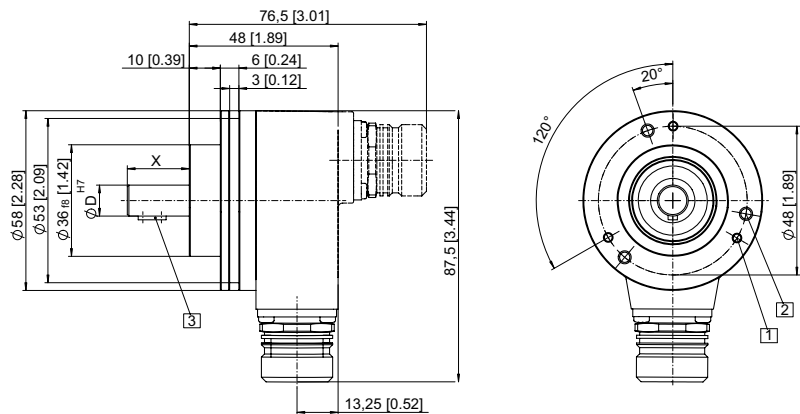
Dimensions shaft version

Clamping flange

Flange type 1 with shaft type 2
(Drawing with cable)



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
optional: Feather key DIN 6885 - A - 4x4x8

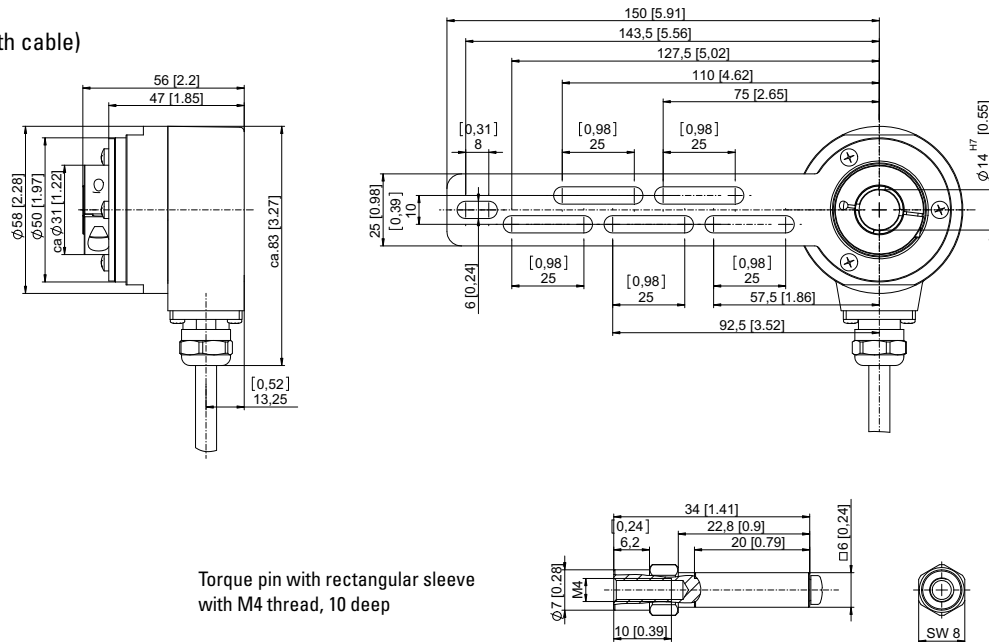
Encoders for Functional Safety

Absolute Singleturn Encoders **Sendix absolute** **5853 SIL / 5873 SIL (Shaft / Hollow shaft)** **Functional Safety**

Dimensions hollow shaft version

With torque stop set

Flange type A (Drawing with cable)

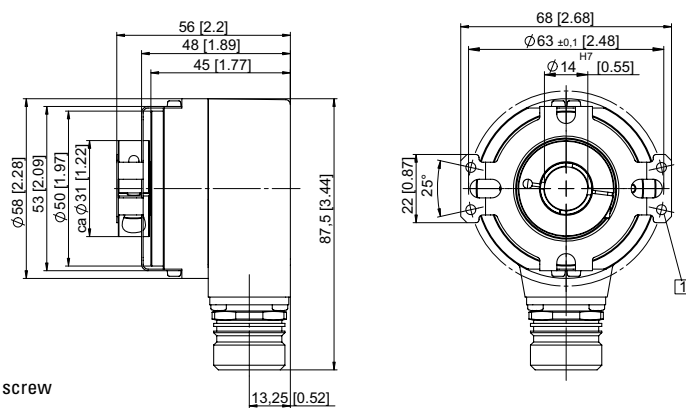


Torque pin with rectangular sleeve with M4 thread, 10 deep

Flange with stator coupling and hollow shaft

Flange type B

(Drawing with M23 connector)

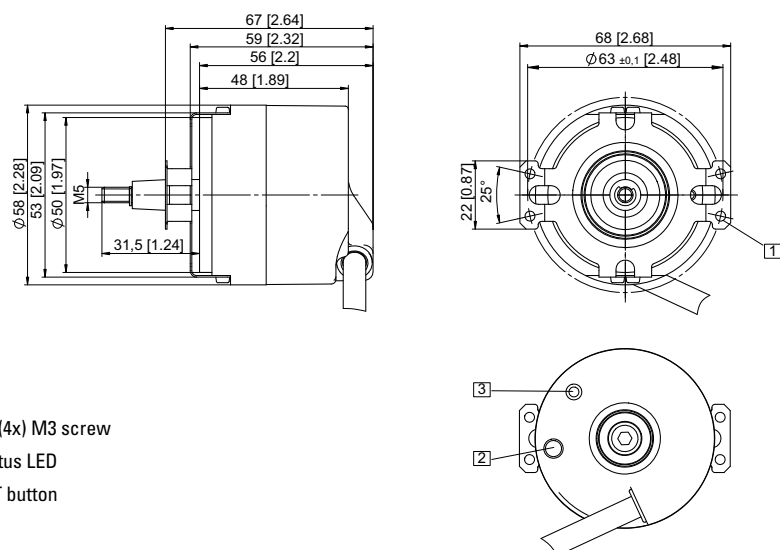


1 for (4x) M3 screw

Flange with stator coupling and tapered shaft

Flange type B

(Drawing with tangential cable outlet)



1 for (4x) M3 screw
2 Status LED
3 SET button