

Absolute encoders - singleturn

**Standard
optical**

Sendix 5853 / 5873 (shaft / hollow shaft)

SSI / BiSS + incremental



The Sendix 5853 and Sendix 5873 singleturn encoders with optical sensor technology can achieve a resolution of max. 21 bits.

Easy integration in the application thanks to the BiSS interface, with electronic data sheet.

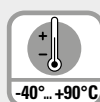
This series offers special versions for use on direct drives for the lift technology.



Electronic data sheet



Safety-Lock™



Temperature range
-40°...+90°C



High protection level
IP67



High shaft load capacity



Shock / vibration resistant



Magnetic field proof



Short-circuit proof



Reverse polarity protection



SinCos



Optical sensor

Reliable and insensitive

- Sturdy bearing construction in Safety-Lock™ design for resistance against vibration and installation errors.
- Ideal for use outdoors thanks to IP67 protection and wide temperature range from -40 °C up to +90 °C.

Versatile

- High-precision with a data refresh rate of the position value $\leq 1\mu s$.
- High-resolution feedback in real-time via 21 bit fully digital or incremental outputs SinCos and RS422.
- BiSS-C BP3 encoder profile.
- Short control cycles, clock rate with SSI up to 2 MHz / with BiSS up to 10 MHz.

Order code Shaft version

8.5853
Type

. XXXX . XX2X
a b c d e f g

a Flange

- 1 = clamping flange, IP65, $\varnothing 58$ mm [2.28"]
3 = clamping flange, IP67, $\varnothing 58$ mm [2.28"]
2 = synchro flange, IP65, $\varnothing 58$ mm [2.28"]
4 = synchro flange, IP67, $\varnothing 58$ mm [2.28"]
5 = square flange, IP65, $\square 63.5$ mm [2.5"]
7 = square flange, IP67, $\square 63.5$ mm [2.5"]

b Shaft ($\varnothing \times L$), with flat

- 1 = 6 x 10 mm [0.24 x 0.39"]¹⁾
2 = 10 x 20 mm [0.39 x 0.79"]²⁾
3 = 1/4" x 7/8"
4 = 3/8" x 7/8"

c Interface / supply voltage

- 1 = SSI, BiSS / 5 V DC
2 = SSI, BiSS / 10 ... 30 V DC
3 = SSI, BiSS + 2048 ppr. SinCos / 5 V DC
4 = SSI, BiSS + 2048 ppr. SinCos / 10 ... 30 V DC
5 = SSI, BiSS / 5 V DC, with sensor output
6 = SSI, BiSS + 2048 ppr. SinCos / 5 V DC, with sensor output
7 = SSI, BiSS + 2048 ppr. RS422 (TTL-comp.) / 5 V DC
8 = SSI, BiSS + 2048 ppr. RS422 (TTL-comp.) / 10 ... 30 V DC
9 = SSI, BiSS + 2048 ppr. RS422 (TTL-comp.) / 5 V DC, with sensor output

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-pin³⁾
6 = radial M12 connector, 8-pin³⁾

*) Available special lengths (connection types A, B):
2, 3, 5, 8, 10, 15 m [5.56, 9.84, 16.40, 26.25, 32.80, 49.21']
order code expansion .XXXX = length in dm
ex.: 8.5853.112A.G323.0030 (for cable length 3 m)

e Code

- B = SSI, binary
C = BiSS, binary
G = SSI, gray

f Resolution⁴⁾

- A = 10 bit
1 = 11 bit
2 = 12 bit
3 = 13 bit
4 = 14 bit
7 = 17 bit
9 = 19 bit
C = 21 bit⁵⁾

g Options (service)

- 1 = no option
2 = status LED
3 = SET button and status LED

Optional on request

- Ex 2/22⁶⁾
- surface protection
salt spray tested
- other resolutions

1) Preferred type only in conjunction with flange type 2.

2) Preferred type only in conjunction with flange type 1.

3) Can be combined only with interface 1 and 2.

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

5) Only in conjunction with interface 1 or 2.

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

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Standard optical	Sendix 5853 / 5873 (shaft / hollow shaft)		SSI / BiSS + incremental
Order code	8.5873	.XXXX.XX2X	
Hollow shaft	Type	a b c d e f g	
a Flange 1 = with spring element, long, IP65 2 = with spring element, long, IP67 3 = with stator coupling, IP65 ø 65 mm [2.56"] 4 = with stator coupling, IP67 ø 65 mm [2.56"] 5 = with stator coupling, IP65 ø 63 mm [2.48"] 6 = with stator coupling, IP67 ø 63 mm [2.48"] G = with stator coupling, IP65 ø 72 mm [2.83"]¹⁾ H = with expanding coupling, IP65 ø 65 mm [2.56"]¹⁾ b Through hollow shaft 3 = ø 10 mm [0.39"] 4 = ø 12 mm [0.47"] 5 = ø 14 mm [0.55"] 6 = ø 15 mm [0.59"] 8 = ø 3/8" 9 = ø 1/2" <i>Tapered shaft</i> K = ø 10 mm [0.39"] c Interface / supply voltage 1 = SSI, BiSS / 5 V DC 2 = SSI, BiSS / 10 ... 30 V DC 3 = SSI, BiSS + 2048 ppr. SinCos / 5 V DC 4 = SSI, BiSS + 2048 ppr. SinCos / 10 ... 30 V DC 5 = SSI, BiSS / 5 V DC, with sensor output 6 = SSI, BiSS + 2048 ppr. SinCos / 5 V DC, with sensor output 7 = SSI, BiSS + 2048 ppr. RS422 (TTL-comp.) / 5 V DC 8 = SSI, BiSS + 2048 ppr. RS422 (TTL-comp.) / 10 ... 30 V DC 9 = SSI, BiSS + 2048 ppr. RS422 (TTL-comp.) / 5 V DC, with sensor output d Type of connection 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-pin²⁾ e Code B = SSI, binary C = BiSS, binary G = SSI, gray f Resolution³⁾ A = 10 bit 1 = 11 bit 2 = 12 bit 3 = 13 bit 4 = 14 bit 7 = 17 bit 9 = 19 bit C = 21 bit⁴⁾ g Options (service) 1 = no option 2 = status LED 3 = SET button and status LED <i>Optional on request</i> - Ex 2/22 (not with type of connection E or F)⁵⁾ - surface protection salt spray tested - other resolutions			
*) Available special lengths (connection types B, F): 2, 3, 5, 8, 10, 15 m [5.56, 9.84, 16.40, 26.25, 32.80, 49.21'] order code expansion .XXXX = length in dm ex.: 8.5873.542B.G323.0030 (for cable length 3 m)			

Mounting accessory for shaft encoders		Order no.
Coupling	bellows coupling ø 19 mm [0.75"] for shaft 6 mm [0.24"]	8.0000.1102.0606
	bellows coupling ø 19 mm [0.75"] for shaft 10 mm [0.39"]	8.0000.1102.1010
Mounting accessory for hollow shaft encoders Dimensions in mm [inch]		Order no.
Torque pin, ø 4 mm for flange with spring element (flange type 1)	with fixing thread 	8.0010.4700.0000
Cables and connectors		Order no.
Preassembled cables	M12 female connector with coupling nut, 8-pin, A coded, straight single-ended 2 m [6.56'] PVC cable	05.00.6041.8211.002M
	M23 female connector with coupling nut, 12-pin, cw single-ended 2 m [6.56'] PVC cable	8.0000.6901.0002.0031
Connectors	M12 female connector with coupling nut, 8-pin, A coded, straight (metal)	05.CMB 8181-0
	M23 female connector with coupling nut, 12-pin, cw	8.0000.5012.0000

Further Kübler accessories can be found at: kuebler.com/accessories
 Further Kübler cables and connectors can be found at: kuebler.com/connection-technology

1) Can be combined only with shaft K and type of connection E or F.
 2) Can be combined only with interface 1 and 2.
 3) Resolution, preset value and counting direction factory-programmable.

4) Only in conjunction with interface 1 or 2.
 5) For the cable connection type, cable material PUR.

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Technical data

Mechanical characteristics		
Maximum speed shaft version		
IP65 up to 70 °C [158 °F]	12000 min ⁻¹ , 10000 min ⁻¹ (continuous)	
IP65 up to T _{max}	8000 min ⁻¹ , 5000 min ⁻¹ (continuous)	
IP67 up to 70 °C [158 °F]	11000 min ⁻¹ , 9000 min ⁻¹ (continuous)	
IP67 up to T _{max}	8000 min ⁻¹ , 5000 min ⁻¹ (continuous)	
Maximum speed hollow shaft version		
IP65 up to 70 °C [158 °F]	9000 min ⁻¹ , 6000 min ⁻¹ (continuous)	
IP65 up to T _{max}	6000 min ⁻¹ , 3000 min ⁻¹ (continuous)	
IP67 up to 70 °C [158 °F]	8000 min ⁻¹ , 4000 min ⁻¹ (continuous)	
IP67 up to T _{max}	4000 min ⁻¹ , 2000 min ⁻¹ (continuous)	
Starting torque		
at 20 °C [68 °F]	IP65	< 0.01 Nm
	IP67	< 0.05 Nm
Mass moment of inertia		
	shaft version	3.0 x 10 ⁻⁶ kgm ²
	hollow shaft version	6.0 x 10 ⁻⁶ kgm ²
Load capacity of shaft		
	radial	80 N
	axial	40 N
Weight		
		approx. 0.35 kg [12.35 oz]
Protection		
acc. to EN 60529	housing side	IP67
	shaft side	IP65, opt. IP67
Working temperature range		
		-40 °C ... +90 °C [-40 °F ... +194 °F] ¹⁾
Materials		
	shaft/hollow shaft	stainless steel
	flange	aluminum
	housing	zinc die-cast
	cable	PVC (PUR for Ex 2/22)
Shock resistance acc. EN 60068-2-27		
		2500 m/s ² , 6 ms
Vibration resistance acc. EN 60068-2-6		
		100 m/s ² , 55 ... 2000 Hz

Electrical characteristics		
Supply voltage		
		5 V DC (+5 %) or 10 ... 30 V DC
Current consumption (no load)		
	5 V DC	max. 70 mA
	10 ... 30 V DC	max. 45 mA
Reverse polarity protection of the supply voltage		
		yes
Short circuit proof outputs		
		yes ²⁾

SSI interface		
Output driver		
		RS422 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
Resolution		
		10 ... 14 bit; 17, 19 and 21 bit
Code		
		binary or gray
SSI clock rate		
		50 kHz ... 2 MHz
Data refresh rate		
	ST resolution ≤ 14 bit	≤ 1 μs
	ST resolution > 14 bit	≤ 4 μs
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.		

BiSS interface		
Output driver		
		RS422 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
Resolution		
		10 ... 14 bit; 17, 19 and 21 bit
Code		
		binary
Clock rate		
		50 kHz ... 10 MHz
Max. update rate		
		< 15 μs, depends on the clock rate and the data length
Data refresh rate		
	ST resolution ≤ 14 bit	≤ 1 μs
	ST resolution > 14 bit	≤ 4 μs
Protocol		
		BiSS-C BP3 encoder profile
Note:		
	- Bidirectional, factory programmable parameters are: resolution, code, direction, alarms and warnings - CRC data verification - EDS (electronic data sheet)	

Status output and LED		
Output driver	open collector, internal pull up resistor 22 kOhm	
Permissible load	max. 20 mA	
Signal level	HIGH	+V
	LOW	< 1 V
Active	LOW	
The optional LED (red) and the status output serve to display various alarm or error messages. In normal operation the LED is OFF and the status output is HIGH (Open Collector with int. pull-up 22 kOhm).		
An active status output (LOW) displays:		
- Sensor error, singleturn or multiturn (soiling, glass breakage etc.) - LED fault (failure or ageing) - over- or under-temperature		
In the SSI mode, the fault indication can only be reset by switching off the supply voltage to the device.		

Incremental outputs (A/B)		
	SinCos	RS422 TTL compatible
Max. frequency -3dB		
	400 kHz	400 kHz
Signal level		
	1 V _{pp} (±20 %)	HIGH: min. 2.5 V LOW: max. 0.5 V
Short circuit proof		
	yes ²⁾	yes ²⁾
Pulse rate		
	2048 ppr	2048 ppr

1) Cable version: -30 °C ... +75 °C [-22 °F ... +167 °F].

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

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SET input or SET button		
Input	active HIGH	
Input type	comparator	
Signal level	HIGH	min: 60 % of +V (supply voltage) 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	
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 processing 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 status output is at LOW. If this input is not used, it should be connected to 0 V (Encoder ground GND) in order to avoid interferences.		

DIR input	
Direction input: A HIGH signal switches the direction of rotation from the default cw to ccw. This inverted function can also be factory-programmed. If DIR is changed when the device is already switched on, then this will be interpreted as an error. The status output will switch to LOW. If this input is not used, it should be connected to 0 V (Encoder ground GND) in order to avoid interferences.	
Response time (DIR input)	1 ms

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

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)

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Terminal assignment

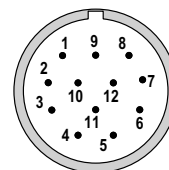
Interface	Type of connection	Features	Cable (isolate unused cores individually before initial start-up)													
1, 2	1, 2, A, B, E, F	SET, DIR, Status	Signal:	0 V	+V	C+	C-	D+	D-	SET	DIR	ERR\	N/C	N/C	N/C	⊥
			Core color:	WH	BN	GN	YE	GY	PK	BU	RD	BK	-	-	-	shield
Interface	Type of connection	Features	M23 connector, 12-pin													
1, 2	3, 4	SET, DIR, Status	Signal:	0 V	+V	C+	C-	D+	D-	SET	DIR	ERR\	N/C	N/C	N/C	⊥
			Pin:	1	2	3	4	5	6	7	8	9	10	11	12	PH
Interface	Type of connection	Features	Cable (isolate unused cores individually before initial start-up)													
5	1, 2, A, B, E, F	SET, DIR, Status sensor output	Signal:	0 V	+V	C+	C-	D+	D-	SET	DIR	ERR\	N/C	0Vsens	+Vsens	⊥
			Core color:	WH	BN	GN	YE	GY	PK	BU	RD	BK	-	GY-PK	RD-BU	shield
Interface	Type of connection	Features	M23 connector, 12-pin													
5	3, 4	SET, DIR, Status sensor output	Signal:	0 V	+V	C+	C-	D+	D-	SET	DIR	ERR\	N/C	0Vsens	+Vsens	⊥
			Pin:	1	2	3	4	5	6	7	8	9	10	11	12	PH
Interface	Type of connection	Features	Cable (isolate unused cores individually before initial start-up)													
3, 4, 7, 8	1, 2, A, B, E, F	SET, DIR, SinCos or incr. RS422	Signal:	0 V	+V	C+	C-	D+	D-	SET	DIR	A	$\bar{A}$	B	$\bar{B}$	⊥
			Core color:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY-PK	RD-BU	shield
Interface	Type of connection	Features	M23 connector, 12-pin													
3, 4, 7, 8	3, 4	SET, DIR, SinCos or incr. RS422	Signal:	0 V	+V	C+	C-	D+	D-	SET	DIR	A	$\bar{A}$	B	$\bar{B}$	⊥
			Pin:	1	2	3	4	5	6	7	8	9	10	11	12	PH
Interface	Type of connection	Features	Cable (isolate unused cores individually before initial start-up)													
6, 9	1, 2, A, B, E, F	SinCos o. incr. RS422 sensor output	Signal:	0 V	+V	C+	C-	D+	D-	A	$\bar{A}$	B	$\bar{B}$	0Vsens	+Vsens	⊥
			Core color:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY-PK	RD-BU	shield
Interface	Type of connection	Features	M23 connector, 12-pin													
6, 9	3, 4	SinCos o. incr. RS422 sensor output	Signal:	0 V	+V	C+	C-	D+	D-	A	$\bar{A}$	B	$\bar{B}$	0Vsens	+Vsens	⊥
			Pin:	1	2	3	4	5	6	7	8	9	10	11	12	PH
Interface	Type of connection	Features	M12 connector, 8-pin													
1, 2	5, 6	SET, DIR	Signal:	0 V	+V	C+	C-	D+	D-	SET	DIR	⊥				
			Pin:	1	2	3	4	5	6	7	8	PH				

+V: Supply voltage encoder +V DC
 0 V: Supply voltage encoder ground GND (0 V)
 0 Vsens / +Vsens: Using the sensor outputs of the encoder, the voltage present can be measured and if necessary increased accordingly.
 C+, C-: Clock signal
 D+, D-: Data signal
 A, $\bar{A}$: Incremental output channel A (cosine)
 B, $\bar{B}$: Incremental output channel B (sine)
 SET: Set input
 DIR: Direction input
 ERR: Status output
 PH ⊥: Plug connector housing (shield)

Top view of mating side, male contact base



M12 connector, 8-pin



M23 connector, 12-pin

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Dimensions shaft version

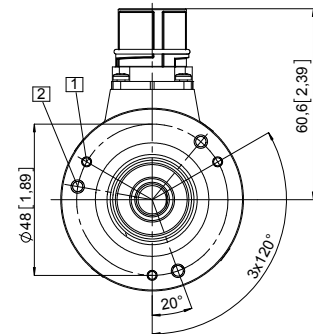
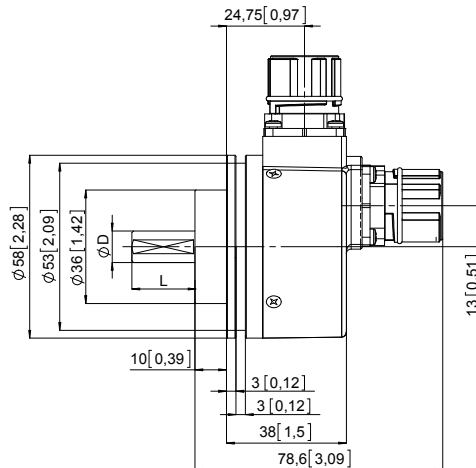
Dimensions in mm [inch]

Clamping flange, ø 58 [2.28]

Flange type 1 and 3

(drawing with M23 connector)

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



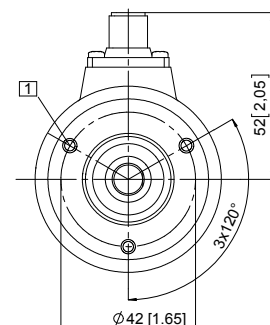
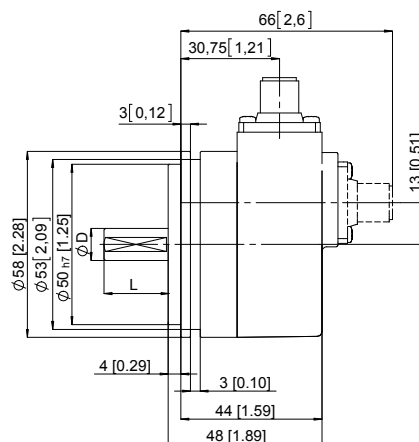
D	Fit	L
6 [0.24]	h7	10 [0.39]
10 [0.39]	f7	20 [0.79]
1/4"	h8	7/8"
3/8"	h8	7/8"

Synchro flange, ø 58 [2.28]

Flange type 2 and 4

(drawing with M12 connector)

- 1 3 x M4, 6 [0.24] deep

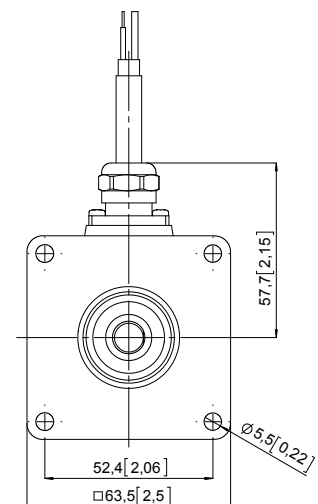
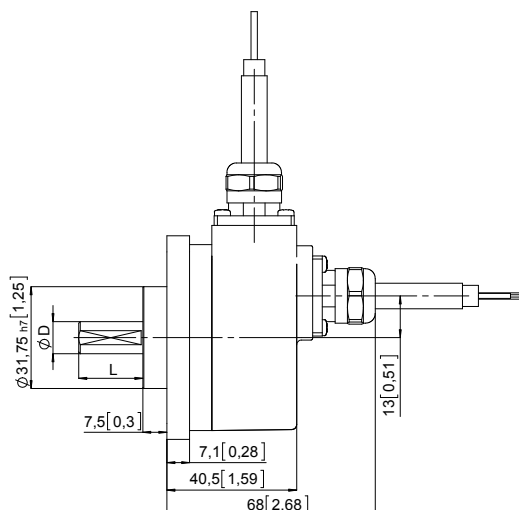


D	Fit	L
6 [0.24]	h7	10 [0.39]
10 [0.39]	f7	20 [0.79]
1/4"	h8	7/8"
3/8"	h8	7/8"

Square flange, □ 63.5 [2.5]

Flange type 5 and 7

(drawing with cable)



D	Fit	L
6 [0.24]	h7	10 [0.39]
10 [0.39]	f7	20 [0.79]
1/4"	h8	7/8"
3/8"	h8	7/8"

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Dimensions hollow shaft version

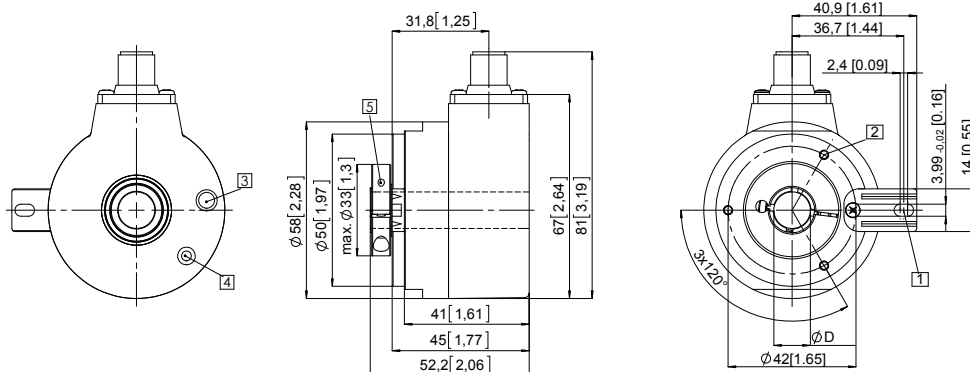
Dimensions in mm [inch]

Flange with spring element, long

Flange type 1 and 2

(drawing with M12 connector)

- 1 Slot spring element, recommendation: torque pin DIN 7, $\varnothing$ 4 [0.16]
- 2 3 x M3, 5.5 [0.22] deep
- 3 Status-LED
- 4 SET button
- 5 Recommended torque for the clamping ring 0.6 Nm



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

Flange with stator coupling, $\varnothing$ 65 [2.56]

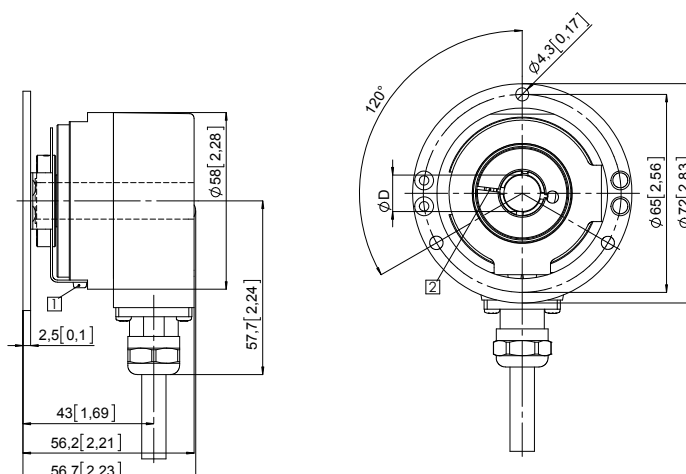
Flange type 3 and 4

Pitch circle diameter for fixing screws

65 [2.56]

(drawing with cable)

- 1 Fixing screws DIN 912 M3 x 8 (washer included in delivery)
- 2 Recommended torque for the clamping ring 0.6 Nm



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

Flange with stator coupling, $\varnothing$ 63 [2.48]

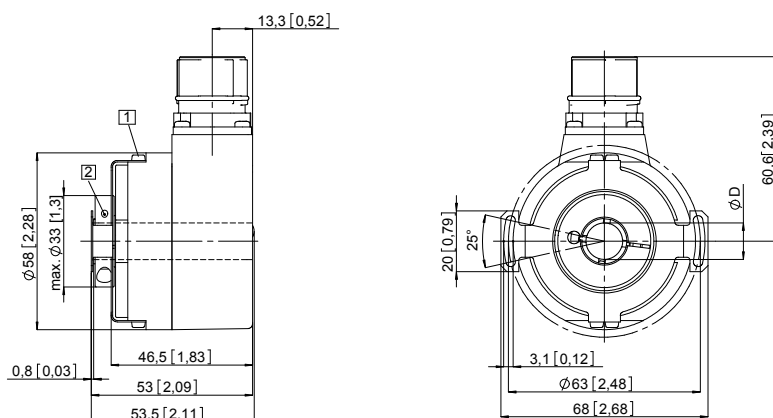
Flange type 5 and 6

Pitch circle diameter for fixing screws

63 [2.48]

(drawing with M23 connector)

- 1 Fixing screws DIN 912 M3 x 8 (washer included in delivery)
- 2 Recommended torque for the clamping ring 0.6 Nm



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

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Dimensions hollow shaft version

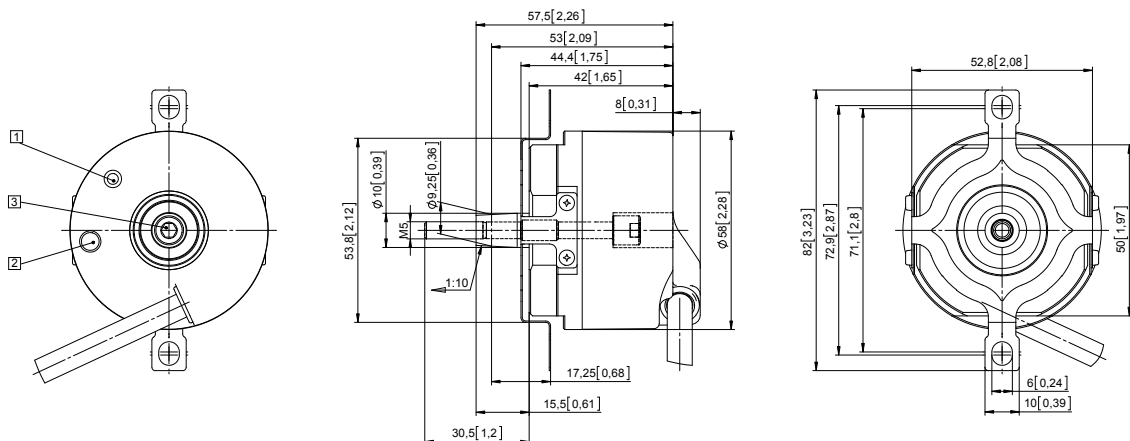
Dimensions in mm [inch]

Flange with stator coupling, $\varnothing 72$ [2.83]

Flange type G

(with tapered shaft K and tangential cable)

- 1 Status LED
- 2 SET Button
- 3 Recommended torque for (SW 4) tightening screw $3^{+0.5}$ Nm



Dimensions hollow shaft version

Dimensions in mm [inch]

Flange with expanding coupling, $\varnothing 65$ [2.56"]

Flange type H

- 1 Status-LED
- 2 SET button
- 3 Recommended torque for (SW 4) tightening screw $3^{+0.5}$ Nm
- 4 Recommended torque for (SW 2) tightening screw 1 Nm

