

Инкрементные стандартные энкодеры Sendix

Технические характеристики

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Incremental encoders

Standard
optical

Sendix Base KIS50 / KIH50 (shaft / hollow shaft)

Push-pull / RS422 / Open collector



The encoders Sendix Base KIS50 / KIH50 offer a protection level up to IP65 and can be used with temperatures from -20 °C up to +70 °C. They are ideal for use in standard applications and in simple machines.

The Sendix Base KIS50 / KIH50 family also features our well proven Safety-Lock™ system, allowing higher tolerance of possible installation errors and increasing the overall performance of this encoder.



Safety-Lock™



High rotational speed



Temperature range
-20°C ... +70°C



High protection level
IP



High shaft load capacity



Shock / vibration resistant



Magnetic field proof



Short-circuit proof



Reverse polarity protection



Optical sensor

Robust

- Resistant zinc die-cast housing and protection up to IP65.
- Wide temperature range, -20 °C ... +70 °C.
- Elimination of machine downtime thanks to sturdy bearing construction in "Safety-Lock™ Design".

Flexible

- Suitable connection variant for every specific case: cable connection, M12 and M23 connector.
- Various mounting options.
- Up to 5000 pulses per revolution.

Order code Shaft version

8.KIS50 . XXXXX . XXXX
Type a b c d e

a Flange

8 = clamping flange, IP65 ø 58 mm [2.28"]
B = synchro flange, IP65 ø 58 mm [2.28"]

b Shaft (ø x L), with flat

1 = ø 6 x 10 mm [0.24 x 0.39"]
6 = ø 8 x 15 mm [0.32 x 0.59"]
3 = ø 10 x 20 mm [0.39 x 0.79"]
D = ø 10 x 20 mm [0.39 x 0.79"], on both sides ¹⁾
5 = ø 12 x 20 mm [0.47 x 0.79"]
8 = ø 3/8 x 7/8"

c Output circuit / supply voltage

4 = RS422 / 5 V DC
1 = RS422 / 5 ... 30 V DC
2 = push-pull / 5 ... 30 V DC
5 = push-pull / 10 ... 30 V DC
3 = open collector / 5 ... 30 V DC

d Type of connection

1 = axial cable, 1 m [3.28'] PVC
2 = radial cable, 1 m [3.28'] PVC
P = axial M12 connector, 5-pin
R = radial M12 connector, 5-pin
3 = axial M12 connector, 8-pin
4 = radial M12 connector, 8-pin
7 = axial M23 connector, 12-pin
8 = radial M23 connector, 12-pin

e Pulse rate

100, 120, 200, 250, 256, 300, 360, 500, 512,
600, 1000, 1024, 1200, 2000, 2048, 2500,
3000, 3600, 4096, 5000
(e.g. 100 pulses => 0100)

High performance version (optionally available)

- Extended temperature range
- Higher rotational speed
- Higher shock resistance
- Higher vibration resistance

Order code 8.KIS50.xxxx.xxxx.9888

Incremental encoders

Standard optical	Sendix Base KIS50 / KIH50 (shaft / hollow shaft)	Push-pull / RS422 / Open collector
Order code Hollow shaft	8.KIH50 . XXXXX . XXXX Type	
a Flange 2 = with spring element, long, IP65 4 = with torque stop, long, IP65 D = with stator coupling, IP65, ø 63 mm [2.48"]	c Output circuit / supply voltage 4 = RS422 / 5 V DC 1 = RS422 / 5 ... 30 V DC 2 = push-pull / 5 ... 30 V DC 5 = push-pull / 10 ... 30 V DC 3 = open collector / 5 ... 30 V DC	e Pulse rate 100, 120, 200, 250, 256, 300, 360, 500, 512, 600, 1000, 1024, 1200, 2000, 2048, 2500, 3000, 3600, 4096, 5000 (e.g. 100 pulses => 0100)
b Through hollow shaft 9 = ø 8 mm 4 = ø 3/8" (9,52 mm) 3 = ø 10 mm 5 = ø 12 mm 6 = ø 1/2" (12,75 mm) A = ø 14 mm 8 = ø 15 mm	d Type of connection 1 = radial cable, 1 m [3.28'] PVC R = radial M12 connector, 5-pin 2 = radial M12 connector, 8-pin 4 = radial M23 connector, 12-pin E = tangential cable, 1 m [3.28'] PVC	High performance version (optionally available) - Extended temperature range - Higher rotational speed - Higher shock resistance - Higher vibration resistance Order code 8.KIH50.xxxx.xxxx.9888

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 + 2)	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
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

Incremental encoders

Standard optical	Sendix Base KIS50 / KIH50 (shaft / hollow shaft)	Push-pull / RS422 / Open collector
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Technical data

Mechanical characteristics		
Maximum speed		6000 min ⁻¹
	for option 9888	8000 min ⁻¹
		3000 min ⁻¹ (continuous)
Mass moment of inertia	shaft version	approx. 1.8 x 10 ⁻⁶ kgm ²
	hollow shaft version	approx. 6 x 10 ⁻⁶ kgm ²
Starting torque at 20 °C [68 °F]		< 0.01 Nm
Shaft load capacity	radial	80 N
	axial	40 N
Weight		approx. 0.4 kg [14.11 oz]
Protection acc. to EN 60529		IP65
Working temperature range		-20 °C ... +70 °C [-4 °F ... +158 °F]
	for option 9888	-40 °C ... +80 °C [-40 °F ... +176 °F]
Material	shaft	stainless steel
Shock resistance acc. to EN 60068-2-27		
		1000 m/s ² , 6 ms
	for option 9888	2000 m/s ² , 6 ms
Vibration resistance acc. to EN 60068-2-6		
		100 m/s ² , 10 ... 2000 Hz
	for option 9888	200 m/s ² , 10 ... 2000 Hz

Approvals		
CE compliant	in accordance with	
	EMC Directive	2014/30/EU
	RoHS Directive	2011/65/EU

Electrical characteristics						
Output circuit		RS422 (TTL compatible)	RS422 (TTL compatible)	Push-pull	Push-pull (HTL/TTL universal, 7272 compatible)	Open collector (7273)
		Order code 1	4	5	2	3
Supply voltage		5 ... 30 V DC	5 V DC (±5 %)	10 ... 30 V DC	5 ... 30 V DC	5 ... 30 V DC
Power consumption (no load)		typ. 40 mA max. 90 mA	typ. 40 mA max. 90 mA	typ. 50 mA max. 100 mA	typ. 50 mA max. 100 mA	100 mA
Permissible load / channel		max. +/- 20 mA	max. +/- 20 mA	max. +/- 20 mA	max. +/- 20 mA	20 mA sink at 30 V DC
Pulse frequency		max. 300 kHz	max. 300 kHz	max. 300 kHz	max. 300 kHz ¹⁾	max. 300 kHz
Signal level	HIGH	min. 2.5 V	min. 2.5 V	min +V - 1.0 V	min. +V - 2.0 V	
	LOW	max. 0.5 V	max. 0.5 V	max. 0.5 V	max. 0.5 V	
Rising edge time t _r		max. 200 ns	max. 200 ns	max. 1 µs	max. 1 µs	
Falling edge time t _f		max. 200 ns	max. 200 ns	max. 1 µs	max. 1 µs	
Short circuit proof outputs ²⁾		yes ³⁾	yes ³⁾	yes	yes	yes
Reverse polarity protection of the supply voltage		yes	no	yes	no	no

1) Max. recommended cable length 30 m [98.43'].

2) If supply voltage correctly applied.

3) Only one channel allowed to be shorted-out:
at +V= 5 V DC, short-circuit to channel, 0 V, or +V is permitted.
at +V= 5 ... 30 V DC, short-circuit to channel or 0 V is permitted.

Incremental encoders

Standard optical	Sendix Base KIS50 / KIH50 (shaft / hollow shaft)	Push-pull / RS422 / Open collector
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Terminal assignment

Output circuit	Type of connection	Cable (isolate unused cores individually before initial start-up)											
1, 2, 3, 4, 5	KIS50: 1, 2	Signal:	0 V	+V	0 Vsens	+Vsens	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	$\perp$
	KIH50: 1, E	Core color:	WH	BN	GY PK	RD BU	GN	YE	GY	PK	BU	RD	shield

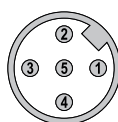
Output circuit	Type of connection	M12 connector, 5-pin						
1, 2, 3, 4, 5	KIS50: P, R	Signal:	0 V	+V	A	B	0	$\perp$
	KIH50: R	Pin:	1	2	3	4	5	PH ¹⁾

Output circuit	Type of connection	M12 connector, 8-pin											
1, 2, 3, 4, 5	KIS50: 3, 4	Signal:	0 V	+V	0 Vsens	+Vsens	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	$\perp$
	KIH50: 2	Pin:	1	2			3	4	5	6	7	8	PH ¹⁾

Output circuit	Type of connection	M23 connector, 12-pin											
1, 2, 3, 4, 5	KIS50: 7, 8	Signal:	0 V	+V	0 Vsens	+Vsens	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	$\perp$
	KIH50: 4	Pin:	10	12	11	2	5	6	8	1	3	4	PH ¹⁾

+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.
 A, $\bar{A}$: Incremental output channel A
 B, $\bar{B}$: Incremental output channel B
 0, $\bar{0}$: Reference signal
 PH $\perp$: Plug connector housing (shield)

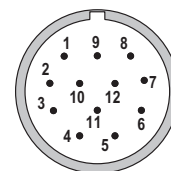
Top view of mating side, male contact base



M12 connector, 5-pin



M12 connector, 8-pin



M23 connector, 12-pin

1) PH = shield is attached to connector housing.

Incremental encoders

Standard optical	Sendix Base KIS50 / KIH50 (shaft / hollow shaft)	Push-pull / RS422 / Open collector
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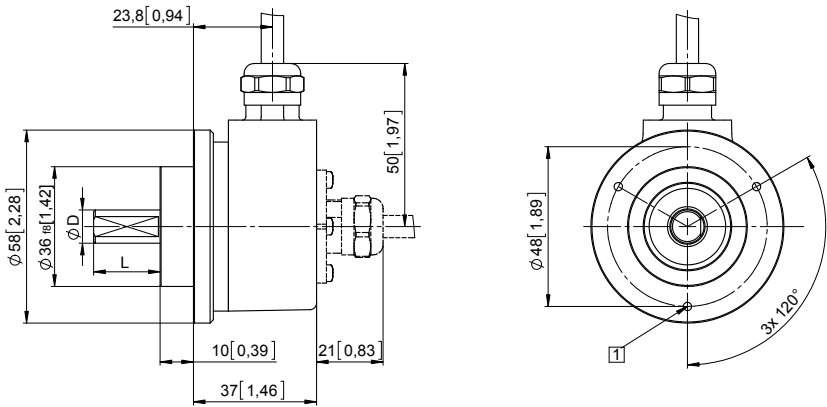
Dimensions shaft version

Dimensions in mm [inch]

Clamping flange, ø 58 [2.28]
Flange type 8

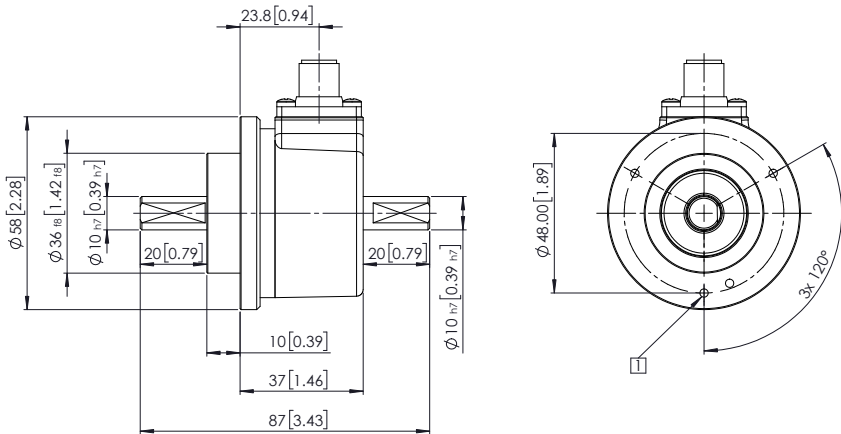
1 3 x M3, 6 [0.24] deep

D	Fit	L
6 [0.24]	h7	10 [0.39]
8 [0.32]	h7	15 [0.59]
10 [0.39]	h7	20 [0.79]
12 [0.47]	h7	20 [0.79]



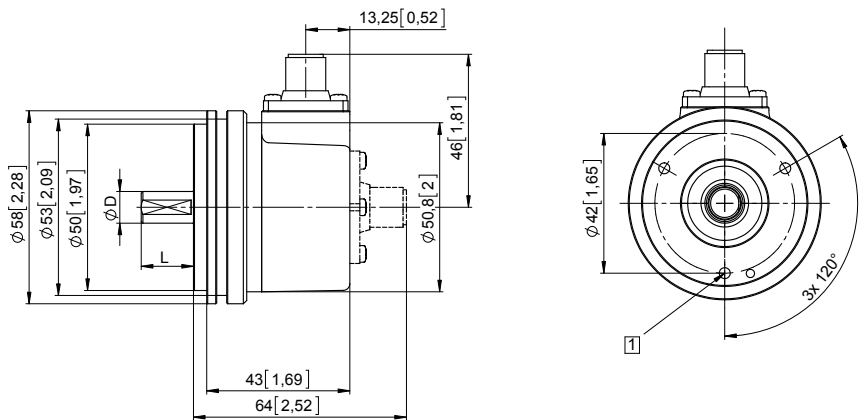
Clamping flange, ø 58 [2.28]
Flange type 8 and shaft ø 10 mm on both sides

1 3 x M3, 6 [0.24] deep



Synchro flange, ø 58 [2.28]
Flange type B

1 3 x M4, 6 [0.24] deep



D	Fit	L
6 [0.24]	h7	10 [0.39]
8 [0.32]	h7	15 [0.59]
10 [0.39]	h7	20 [0.79]
12 [0.47]	h7	20 [0.79]

Incremental encoders

Standard optical

Sendix Base KIS50 / KIH50 (shaft / hollow shaft)

Push-pull / RS422 / Open collector

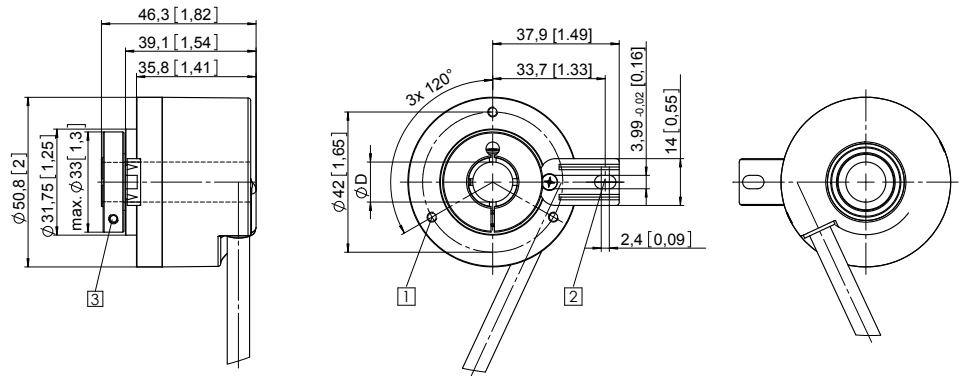
Dimensions hollow shaft version

Dimensions in mm [inch]

Flange with spring element, long Flange type 2

- 1 3 x M3, 6 [0.24] deep
- 2 Slot spring element, recommendation: torque pin DIN 7, $\varnothing$ 4 [0.16]
- 3 Recommended torque for the clamping ring 0.6 Nm

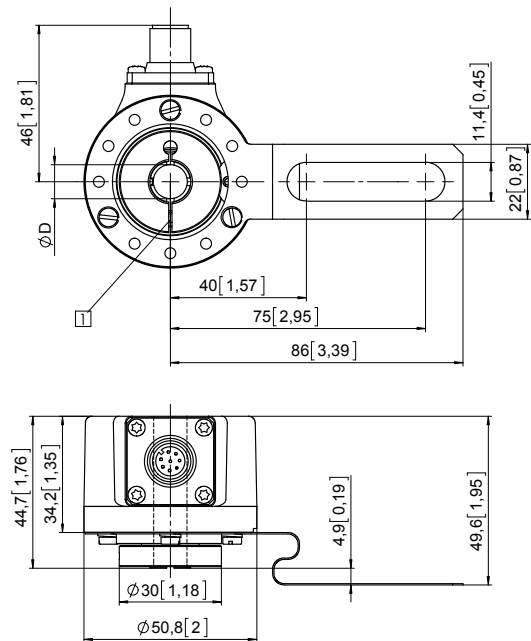
D	Fit
8 [0.32]	H7
10 [0.39]	H7
12 [0.47]	H7
14 [0.55]	H7
15 [0.59]	H7



Flange with torque stop, long Flange type 4

- 1 Recommended torque for the clamping ring 0.6 Nm

D	Fit
8 [0.32]	H7
10 [0.39]	H7
12 [0.47]	H7
14 [0.55]	H7
15 [0.59]	H7

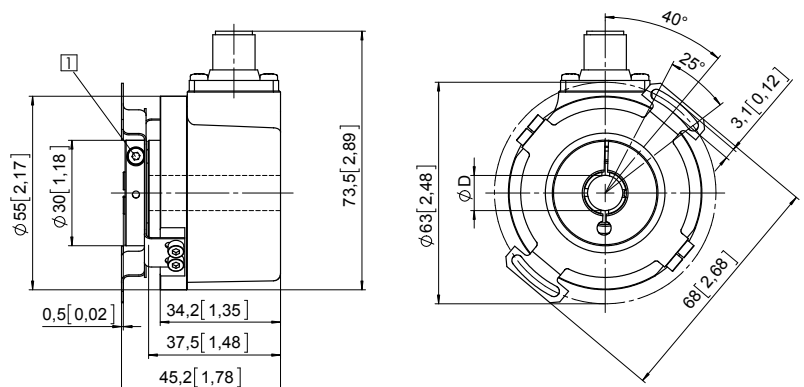


1 Empfohlenes Drehm

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

- 1 Recommended torque for the clamping ring 0.6 Nm

D	Fit
8 [0.32]	H7
10 [0.39]	H7
12 [0.47]	H7
14 [0.55]	H7
15 [0.59]	H7



Incremental encoders

Standard, ATEX/IECEx – mining M2 optical

Sendix 7100 / 7120 (shaft / hollow shaft)

Push-pull / RS422



The incremental encoders Sendix 7100 / 7120 in a compact 70 mm stainless steel housing have an ATEX/IECEx mining M2 approval.

These shock and vibration resistant encoders operate flexibly with a resolution of up to 5000 pulses per revolution; they are also available with axial and radial cable outlets.



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

Compact and safe

- Can be used even when space is tight.
- Minimal installation depth, diameter 70 mm.
- Compact cable outlet axial or radial.
- Remains sealed even in harsh everyday use and ensures highest safety against field breakdowns (IP67 protection).

Explosion protection

- Mining M2 approval.
- "Flame-proof enclosure" construction.
- ATEX with EU type examination certificate.
- IECEx with certificate of conformity (CoC).

Order code

Shaft version

8.7100 . 2XXXX . XXXX . XXXX
Type a b c d e f

a Flange

2 = 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 Output circuit / supply voltage

4 = RS422 (with inverted signal) / 5 V DC

1 = RS422 (with inverted signal) / 5 ... 30 V DC

2 = push-pull (7272 compatible with inverted signal) / 5 ... 30 V DC

5 = push-pull (with inverted signal) / 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']

e Pulse rate

1, 5, 10, 12, 36, 50, 100, 200, 250, 256,

300, 360, 400, 500, 512, 600, 800, 1000,

1024, 1200, 2000, 2048, 2500, 3600,

4096, 5000

(e.g. 100 pulses => 0100)

f Cable length in dm ¹⁾

0050 = 5 m [16.40']

0100 = 10 m [32.81']

0150 = 15 m [49.21']

Optional on request

- other pulse rates

- special cable length

1) Not applicable with connection types 1 and 2.

Incremental encoders

Standard, ATEX/IECEx – mining M2 optical	Sendix 7100 / 7120 (shaft / hollow shaft)	Push-pull / RS422
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Order code Hollow shaft	8.7120 Type	.XXXXX. a b c d	.XXXX. e	.XXXX i
a Flange 2 = with spring element, short 6 = with stator coupling, ø 65 mm [2.56"] b Blind hollow shaft (insertion depth max. 41.5 mm [1.63"]) 1 = ø 12 mm [0.47"] 2 = ø 14 mm [0.55"] c Output circuit / supply voltage 4 = RS422 (with inverted signal) / 5 V DC 1 = RS422 (with inverted signal) / 5 ... 30 V DC 2 = push-pull (7272 compatible with inverted signal) / 5 ... 30 V DC 5 = push-pull (with inverted signal) / 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'] e Pulse rate 1, 5, 10, 12, 36, 50, 100, 200, 250, 256, 300, 360, 400, 500, 512, 600, 800, 1000, 1024, 1200, 2000, 2048, 2500, 3600, 4096, 5000 (e.g. 100 pulses => 0100) i Cable length in dm ¹⁾ 0050 = 5 m [16.40'] 0100 = 10 m [32.81'] 0150 = 15 m [49.21'] Optional on request - other pulse rates - special cable length				

Technical data

Explosion protection		Mechanical characteristics	
ATEX		Maximum speed	
EU type-examination certificate		shaft	6000 min ⁻¹ (continuous)
		hollow shaft	3000 min ⁻¹ (continuous)
Category		Starting torque – at 20 °C [68 °F]	
Sendix 7100 – 6000 rpm	Ex I M2 Ex db I/IIC T4 Mb	< 0.05 Nm	
Sendix 7100 – 2000 rpm	Ex I M2 Ex db I/IIC T5 Mb	Mass moment of inertia	
Sendix 7120 – 3000 rpm	Ex I M2 Ex db I/IIC T4 Mb	4.0 x 10 ⁻⁶ kgm ²	
Sendix 7120 – 2000 rpm	Ex I M2 Ex db I/IIC 120°C (T4) Mb	Load capacity of shaft	
Relevant standards		radial	80 N
ATEX guideline 2014/34/EU	EN 60079-0:2018	axial	40 N
	EN 60079-1:2014	Weight	
IECEx		approx. 2.8 kg [98.77 oz]	
Certificate of Conformity (CoC)		Protection acc. to EN 60529	
Category		IP67	
Sendix 7100 – 6000 rpm	Ex db I/IIC T4 Mb	Ambient temperature	
Sendix 7100 – 2000 rpm	Ex db I/IIC T5 Mb	-40 °C ... +60 °C [-40 °F ... +140 °F]	
Sendix 7120 – 3000 rpm	Ex db I/IIC T4 Mb	Please note the specifications for temperature class in EU type-examination certificate!	
Sendix 7120 – 2000 rpm	Ex db I/IIC 120°C (T4) Mb	Materials	
Relevant standards		shaft	stainless steel
IEC 60079-0:2017	IEC 60079-1:2014	flange / housing	stainless steel
		cable	PUR
EMC		Shock resistance	
Relevant standards		acc. to EN/IEC 60068-2-27	1000 m/s ² , 6 ms
EN 55011 class B	EN (IEC) 61326-1	Vibration resistance	
		acc. to EN/IEC 60068-2-6	100 m/s ² , 55 ... 2000 Hz
Approvals		CE compliant in accordance with	
		EMC Directive	2014/30/EU
		RoHS Directive	2011/65/EU
		ATEX Directive	2014/34/EU

1) Not applicable with connection types 1 and 2.

Incremental encoders

Standard, ATEX/IECEX – mining M2 optical	Sendix 7100 / 7120 (shaft / hollow shaft)	Push-pull / RS422
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Electrical characteristics				
Output circuit	RS422 (TTL compatible)	RS422 (TTL compatible)	Push-pull	Push-pull (7272 compatible)
Order code	1	4	5	2
Supply voltage	5 ... 30 V DC	5 V DC ($\pm 5\%$)	10 ... 30 V DC	5 ... 30 V DC
Power consumption (no load)	typ. 40 mA max. 90 mA	typ. 40 mA max. 90 mA	typ. 50 mA max. 100 mA	typ. 50 mA max. 100 mA
Permissible load / channel	max. ± 20 mA	max. ± 20 mA	max. ± 20 mA	max. ± 20 mA
Pulse frequency	max. 300 kHz	max. 300 kHz	max. 300 kHz	max. 300 kHz ¹⁾
Signal level	HIGH min. 2.5 V LOW max. 0.5 V	min. 2.5 V max. 0.5 V	min +V - 1.0 V max. 0.5 V	min. +V - 2.0 V max. 0.5 V
Rising edge time t_r	max. 200 ns	max. 200 ns	max. 1 μ s	max. 1 μ s
Falling edge time t_f	max. 200 ns	max. 200 ns	max. 1 μ s	max. 1 μ s
Short circuit proof outputs ²⁾	yes ³⁾	yes ³⁾	yes	yes
Reverse polarity protection of the supply voltage	yes	no	yes	no

Terminal assignment

Output circuit	Type of connection	Cable (isolate unused cores individually before initial start-up)											
1, 2, 4, 5	1, 2, A, B	Signal:	0 V	+V	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	0 V _{sens}	+V _{sens}	$\perp$
		Core marking:	1	2	3	4	5	6	7	8	9	10	shield

- +V: Supply voltage encoder +V DC
 0 V: Supply voltage encoder ground GND (0 V)
 0 V_{sens} / +V_{sens}: Using the sensor outputs of the encoder, the voltage present can be measured and if necessary increased accordingly.
 A, $\bar{A}$: Incremental output channel A
 B, $\bar{B}$: Incremental output channel B
 0, $\bar{0}$: Reference signal
 $\perp$: Plug connector housing (shield)

1) Max. recommended cable length 30 m [98.43'].
 2) Short-circuit with 0 V or output, only one channel at a time, supply voltage correctly applied.
 3) Only one channel allowed to be shorted-out:
 at +V= 5 V DC, short-circuit to channel, 0 V, or +V is permitted.
 at +V= 5 ... 30 V DC, short-circuit to channel or 0 V is permitted.

Incremental encoders

Standard, ATEX/IECEx – mining M2 optical

Sendix 7100 / 7120 (shaft / hollow shaft)

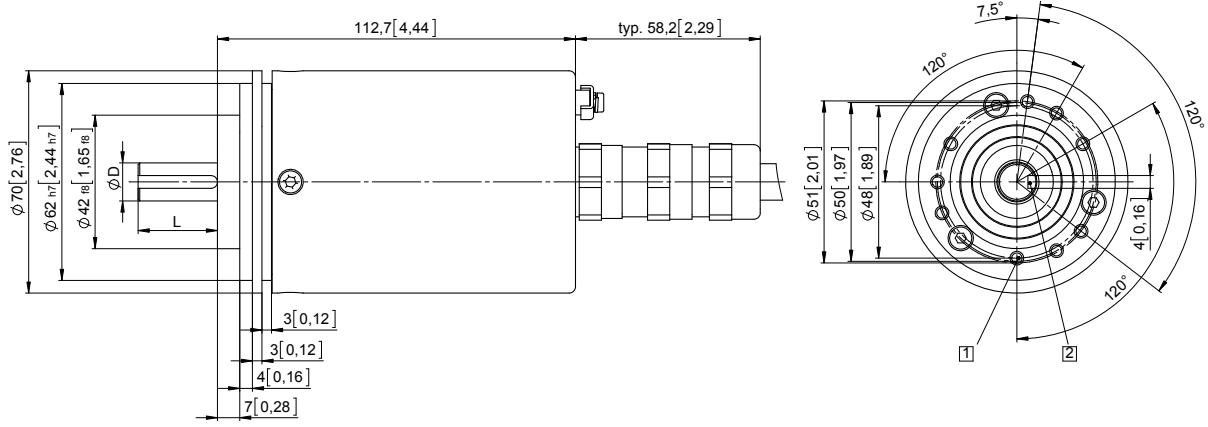
Push-pull / RS422

Dimensions shaft version

Dimensions in mm [inch]

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

- 1 9 x M4, 10 [0.39] deep
- 2 Keyway for DIN 6885-A-4x4x25 key

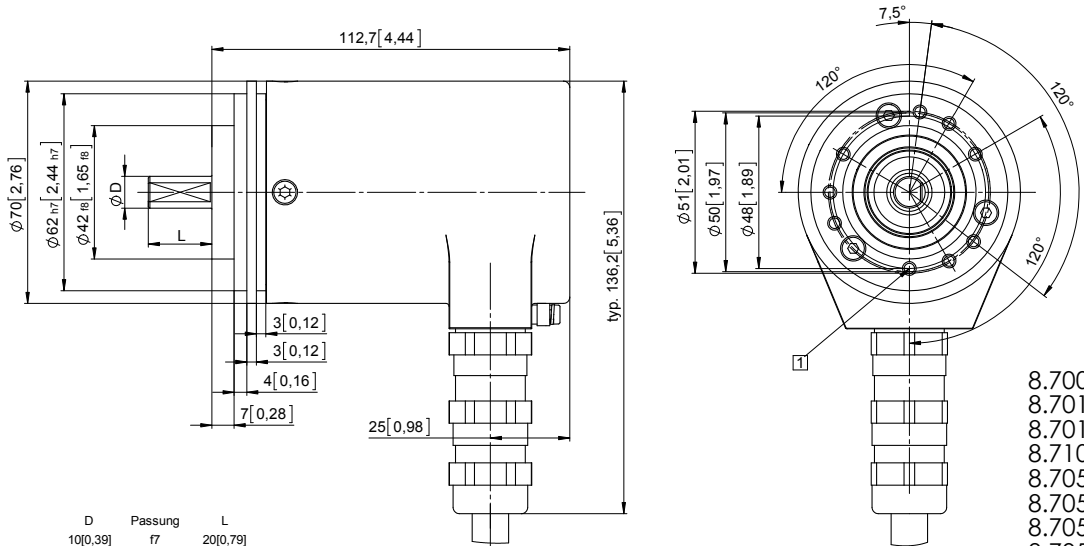


8.7000

D	Fit	L
12 [0.47]	g6	25 [0.98]

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

- 1 9 x M4, 10 [0.39] deep



8.7000
8.7014F
8.7014F
8.7100
8.7053
8.7053F
8.7053F
8.7058
8.7153
8.7158

D	Passung	L
10 [0.39]	f7	20 [0.79]
12 [0.47]	g6	25 [0.98]

Incremental encoders

Standard, ATEX/IECEx – mining M2 optical

Sendix 7100 / 7120 (shaft / hollow shaft)

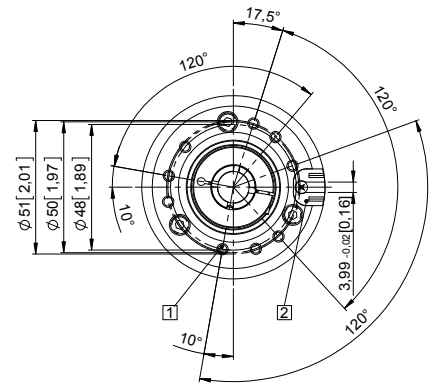
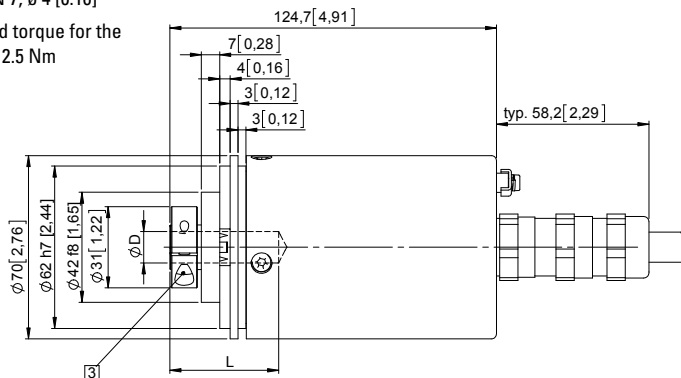
Push-pull / RS422

Dimensions hollow shaft version

Dimensions in mm [inch]

Flange with spring element, short Flange type 2

- 1 9 x M4, 10 [0.39] deep
- 2 Slot spring element, recommendation: torque pin DIN 7, $\varnothing$ 4 [0.16]
- 3 Recommended torque for the clamping ring 2.5 Nm



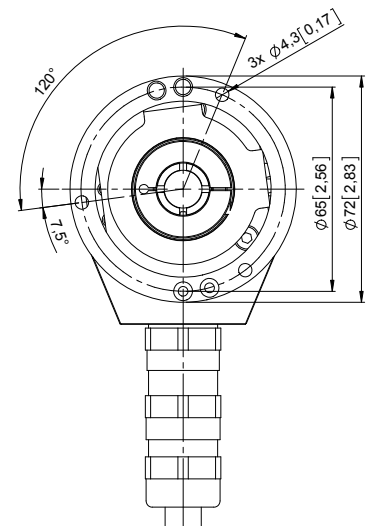
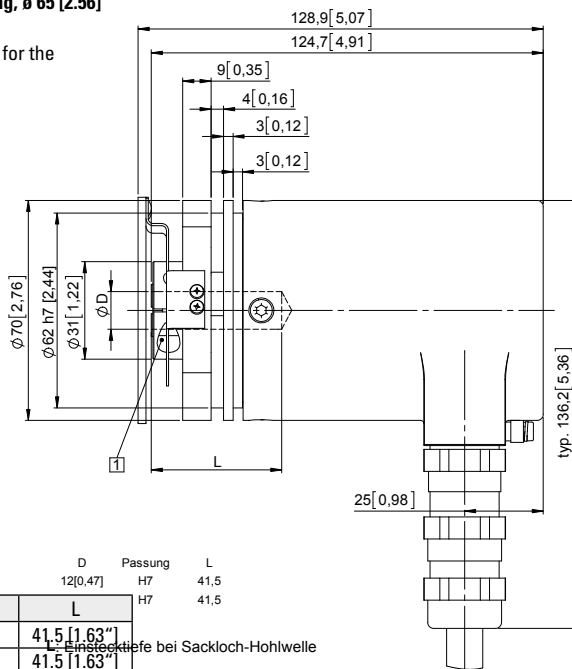
D	Fit	L
12 [0.47]	H7	41.5 [1.63"]
14 [0.55]	H7	41.5 [1.63"]

L = insertion depth max. blind hollow shaft

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

Flange type 6

- 1 Recommended torque for the clamping ring 2.5 Nm



D	Fit	L
12 [0.47]	H7	41.5 [1.63"]
14 [0.55]	H7	41.5 [1.63"]

L = insertion depth max. blind hollow shaft

Incremental encoders

Standard, ATEX/IECEX – zone 1/21
optical

Sendix 7000 / 7020 (shaft / hollow shaft)

Push-pull / RS422



The Sendix 7000 / 7020 incremental encoders offer Ex protection in a compact 70 mm seawater durable aluminum housing.

These shock and vibration resistant encoders operate flexibly with a resolution of up to 5000 pulses per rotation; they are also available with axial and radial cable outlets.



Compact and safe

- Can be used even when space is tight.
- Minimal installation depth, diameter 70 mm.
- Compact cable outlet axial or radial.
- Can be operated in marine environments – housing and flange manufactured from seawater durable aluminum.
- Remains sealed even in harsh everyday use and ensures highest safety against field breakdowns (IP67 protection).

Explosion protection

- “Flameproof-enclosure” version.
- ATEX with EU type examination certificate.
- IECEx with certificate of conformity (CoC).

Order code

Shaft version

8.7000 . 1 X X X . X X X X . X X X X
Type a b c d e f

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 Output circuit / supply voltage

4 = RS422 (with inverted signal) / 5 V DC

1 = RS422 (with inverted signal) / 5 ... 30 V DC

2 = push-pull (7272 compatible with inverted signal) / 5 ... 30 V DC

5 = push-pull (with inverted signal) / 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']

e Pulse rate

1, 5, 10, 12, 36, 50, 100, 200, 250, 256,
300, 360, 400, 500, 512, 600, 800, 1000,
1024, 1200, 2000, 2048, 2500, 3600,
4096, 5000

(e.g. 100 pulses => 0100)

f Cable length in dm ¹⁾

0050 = 5 m [16.40']

0100 = 10 m [32.81']

0150 = 15 m [49.21']

Optional on request

- other pulse rates

- special cable length

- seawater resistant (stainless steel V4A)

1) Not applicable with connection types 1 and 2.

Incremental encoders

Standard, ATEX/IECEX – zone 1/21 optical	Sendix 7000 / 7020 (shaft / hollow shaft)	Push-pull / RS422
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Order code Hollow shaft	8.7020 Type	.XXXXX.XXXX.XXXX a b c d e f
a Flange 1 = with spring element, short 5 = with stator coupling, ø 65 mm [2.56"] b Blind hollow shaft (insertion depth max. 41.5 mm [1.63"]) 1 = ø 12 mm [0.47"] 2 = ø 14 mm [0.55"] c Output circuit / supply voltage 4 = RS422 (with inverted signal) / 5 V DC 1 = RS422 (with inverted signal) / 5 ... 30 V DC 2 = push-pull (7272 compatible with inverted signal) / 5 ... 30 V DC 5 = push-pull (with inverted signal) / 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'] e Pulse rate 1, 5, 10, 12, 36, 50, 100, 200, 250, 256, 300, 360, 400, 500, 512, 600, 800, 1000, 1024, 1200, 2000, 2048, 2500, 3600, 4096, 5000 (e.g. 100 pulses => 0100) f Cable length in dm ¹⁾ 0050 = 5 m [16.40'] 0100 = 10 m [32.81'] 0150 = 15 m [49.21'] Optional on request - other pulse rates - special cable length - seawater resistant (stainless steel V4A)		

Mounting accessory for shaft encoders	Order no.
Coupling bellows coupling ø 19 mm [0.75"] for shaft 10 mm [0.39"]	8.0000.1102.1010

Technical data	
Explosion protection	
ATEX	
EU type-examination certificate	IBExU 15 ATEX 1091 X
Category (gas)	Sendix 7000 – 6000 rpm  II 2G Ex db IIC T4 Gb Sendix 7000 – 2000 rpm  II 2G Ex db IIC T5 Gb Sendix 7020 – 3000 rpm  II 2G Ex db IIC T4 Gb Sendix 7020 – 2000 rpm  II 2G Ex db IIC 120°C (T4) Gb
Category (dust)	Sendix 7000 – 6000 rpm  II 2D Ex tb IIIC T135°C Db Sendix 7000 – 2000 rpm  II 2D Ex tb IIIC T100°C Db Sendix 7020 – 3000 rpm  II 2D Ex tb IIIC T135°C Db Sendix 7020 – 2000 rpm  II 2D Ex tb IIIC T120°C Db
Relevant standards	EN 60079-0:2018
ATEX guideline 2014/34/EU	EN 60079-1:2014 EN 60079-31:2014
IECEX	
Certificate of Conformity (CoC)	IECEX IBE 15.0020 X
Category (gas)	Sendix 7000 – 6000 rpm Ex db IIC T4 Gb Sendix 7000 – 2000 rpm Ex db IIC T5 Gb Sendix 7020 – 3000 rpm Ex db IIC T4 Gb Sendix 7020 – 2000 rpm Ex db IIC 120°C (T4) Gb
Category (dust)	Sendix 7000 – 6000 rpm Ex tb IIIC T135°C Db Sendix 7000 – 2000 rpm Ex tb IIIC T100°C Db Sendix 7020 – 3000 rpm Ex tb IIIC T135°C Db Sendix 7020 – 2000 rpm Ex tb IIIC T120°C Db
Relevant standards	IEC 60079-0:2017 IEC 60079-1:2014 IEC 60079-31:2013
Mechanical characteristics	
Maximum speed	shaft 6000 min⁻¹ (continuous) hollow shaft 3000 min⁻¹ (continuous)
Starting torque – at 20 °C [68 °F]	< 0.05 Nm
Mass moment of inertia	4.0 x 10 ⁻⁶ kgm ²
Load capacity of shaft	radial 80 N axial 40 N
Weight	approx. 1.5 kg [52.91 oz]
Protection acc. to EN 60529	IP67
Ambient temperature	-40 °C ... +60 °C [-40 °C ... +140 °F] Please note the specifications for temperature class in EU type-examination certificate!
Materials	shaft stainless steel flange / housing seawater durable Al, type AlSiMgMn (EN AW-6082) cable PUR
Shock resistance	acc. to EN/IEC 60068-2-27 2500 m/s ² , 6 ms
Vibration resistance	acc. to EN/IEC 60068-2-6 100 m/s ² , 55 ... 2000 Hz

1) Not applicable with connection types 1 and 2.

Incremental encoders

Standard, ATEX/IECEX – zone 1/21 optical	Sendix 7000 / 7020 (shaft / hollow shaft)	Push-pull / RS422
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Electrical characteristics				
Output circuit	RS422 (TTL compatible)	RS422 (TTL compatible)	Push-pull	Push-pull (7272 compatible)
Order code	1	4	5	2
Supply voltage	5 ... 30 V DC	5 V DC (±5 %)	10 ... 30 V DC	5 ... 30 V DC
Power consumption (no load)	typ. 40 mA max. 90 mA	typ. 40 mA max. 90 mA	typ. 50 mA max. 100 mA	typ. 50 mA max. 100 mA
Permissible load / channel	max. +/- 20 mA	max. +/- 20 mA	max. +/- 20 mA	max. +/- 20 mA
Pulse frequency	max. 300 kHz	max. 300 kHz	max. 300 kHz	max. 300 kHz ¹⁾
Signal level	HIGH min. 2.5 V LOW max. 0.5 V	min. 2.5 V max. 0.5 V	min +V - 1.0 V max. 0.5 V	min. +V - 2.0 V max. 0.5 V
Rising edge time t_r	max. 200 ns	max. 200 ns	max. 1 µs	max. 1 µs
Falling edge time t_f	max. 200 ns	max. 200 ns	max. 1 µs	max. 1 µs
Short circuit proof outputs ²⁾	yes ³⁾	yes ³⁾	yes	yes
Reverse polarity protection of the supply voltage	yes	no	yes	no

EMC		Approvals	
Relevant standards	EN 55011 class B EN (IEC) 61326-1	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)

Terminal assignment

Output circuit	Type of connection	Cable (isolate unused cores individually before initial start-up)											
1, 2, 4, 5	1, 2, A, B	Signal:	0 V	+V	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	0 V _{sens}	+V _{sens}	$\perp$
		Core marking:	1	2	3	4	5	6	7	8	9	10	shield

+V: Supply voltage encoder +V DC
 0 V: Supply voltage encoder ground GND (0 V)
 0 V_{sens} / +V_{sens}: Using the sensor outputs of the encoder, the voltage present can be measured and if necessary increased accordingly.
 A, $\bar{A}$: Incremental output channel A / cosine signal
 B, $\bar{B}$: Incremental output channel B / sine signal
 0, $\bar{0}$: Reference signal
 $\perp$: Plug connector housing (shield)

1) Max. recommended cable length 30 m [98.43'].

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

3) Only one channel allowed to be shorted-out:
 at +V= 5 V DC, short-circuit to channel, 0 V, or +V is permitted.
 at +V= 5 ... 30 V DC, short-circuit to channel or 0 V is permitted.

Incremental encoders

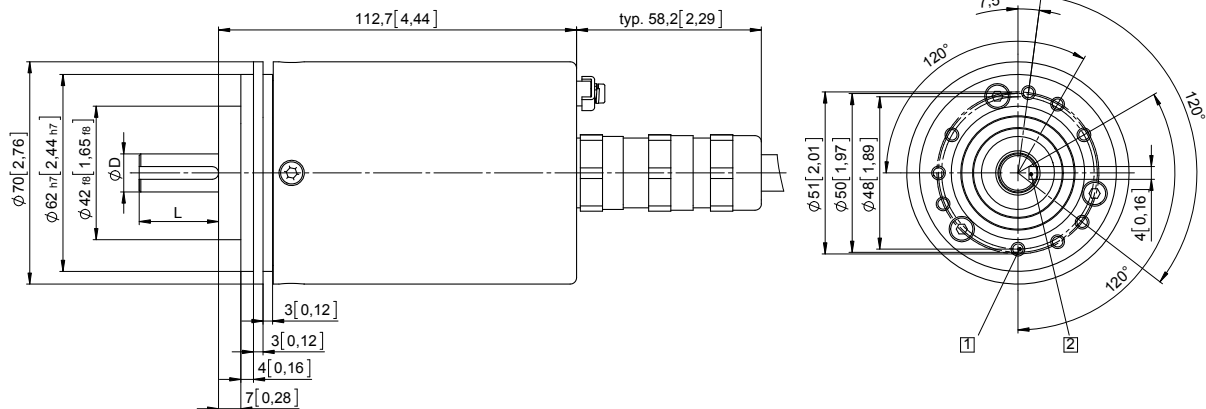
Standard, ATEX/IECEx – zone 1/21 optical	Sendix 7000 / 7020 (shaft / hollow shaft)	Push-pull / RS422
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Dimensions shaft version

Dimensions in mm [inch]

**Clamping / synchronous flange, ø 70 [2.76]
Shaft type 1 with axial cable outlet**

- 1 9 x M4, 10 [0.39] deep
- 2 Keyway for DIN 6885-A-4x4x25 key

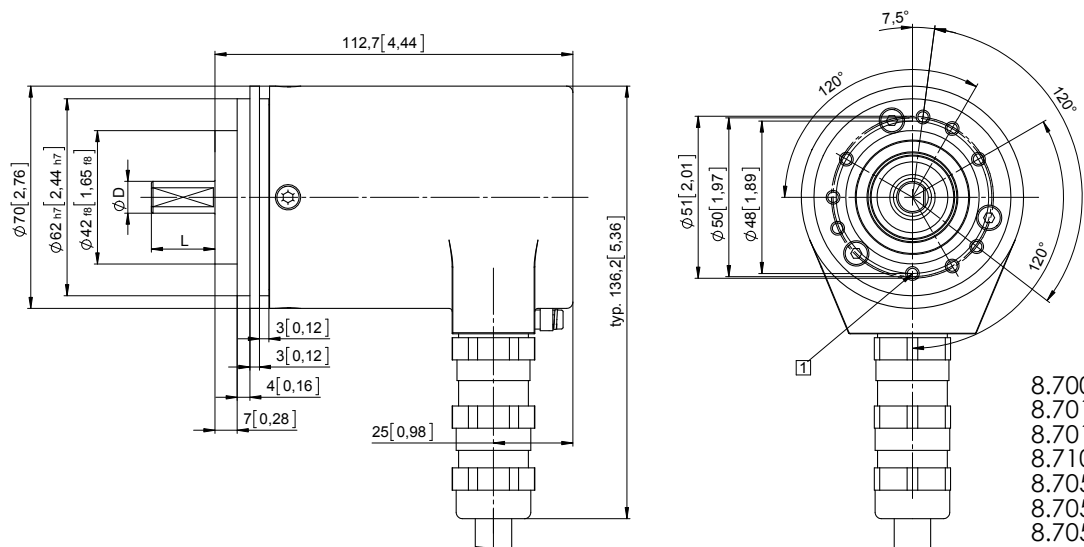


8.7000

D	Fit	L
12 [0.47]	g6	25 [0.98]

**Clamping / synchronous flange, ø 70 [2.76]
Shaft type 2 with radial cable outlet**

- 1 9 x M4, 10 [0.39] deep



8.7000
8.7014F
8.7014F
8.7100
8.7053
8.7053F
8.7053F
8.7058
8.7153
8.7158

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

Incremental encoders

**Standard, ATEX/IECEX – zone 1/21
optical**

Sendix 7000 / 7020 (shaft / hollow shaft)

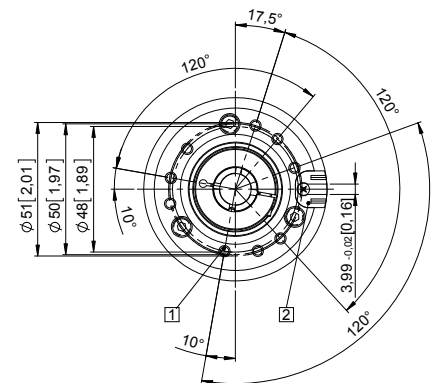
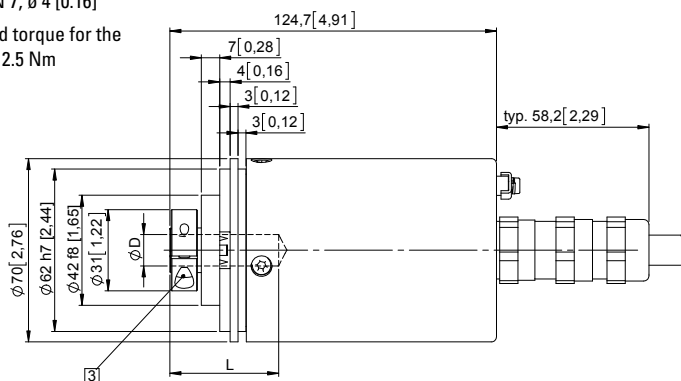
Push-pull / RS422

Dimensions hollow shaft version

Dimensions in mm [inch]

Flange with spring element, short Flange type 1

- 1 9 x M4, 10 [0.39] deep
- 2 Slot spring element, recommendation: torque pin DIN 7, $\varnothing$ 4 [0.16]
- 3 Recommended torque for the clamping ring 2.5 Nm



8.7020

D	Fit	L
12 [0.47]	H7	41.5 [1.63"]
14 [0.55]	H7	41.5 [1.63"]

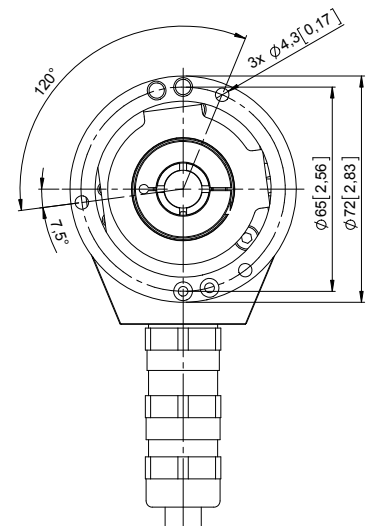
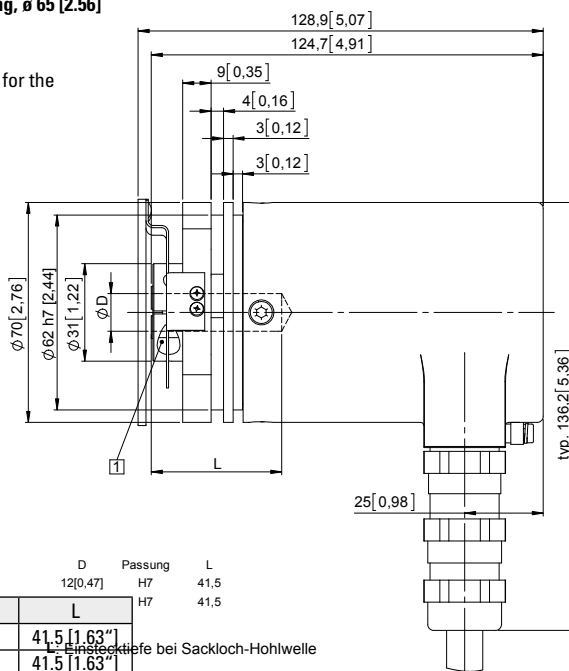
L = insertion depth max. blind hollow shaft

L = insertion depth max. blind hollow shaft

Flange with stator coupling, ø 65 [2.56]

Flange type 5

- 1** Recommended torque for the clamping ring 2.5 Nm



D	Fit	L
12 [0.47]	H7	41,5 [1.63"]
14 [0.55]	H7	41,5 [1.63"]

L = insertion depth max. blind hollow shaft

L = insertion depth max. blind hollow shaft

1 em

Incremental encoders

Standard Motor-Line, optical	Sendix 5834 (tapered shaft)	SinCos
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The incremental encoder Sendix 5834 with SinCos interface is particularly suited for applications in the field of Drive and Elevator Technology.

Thanks to their high signal quality, they are optimally suited for further interpolation.

Safety-Lock™

High rotational speed

Temperature range
-40°...+90°C

IP

High shaft load capacity

Shock / vibration resistant

Magnetic field proof

Reverse polarity protection

SinCos

Optical sensor

Powerful

- With incremental SinCos tracks.
- Very high signal quality.
- Encoder specially designed for mounting on direct drives in the elevator technology.

Flexible

- Stator coupling or expanding coupling.
- Cable or PCB-conconnector.
- 1024 or 2048 ppr.

Order code Tapered shaft	8.5834 Type	. X K X X . X X X X	
		a b c d e	
a Flange G = with stator coupling, ø 72 mm [2.83"] H = with expanding coupling, ø 65 mm [2.56"] b Tapered shaft K = ø 10 mm [0.39"] c Output circuit / supply voltage 1 = SinCos / 5 V DC 2 = SinCos / 10 ... 30 V DC d Type of connection E = tangential cable, 1 m PVC F = tangential cable, length PVC see below *) L = with PCB connector (without cable, including sealing cap for tangential cable outlet) *) Available lengths (connection type 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.: 8.5834.GK2F.1024.0030 (for cable length 3 m) e Pulse rate 1024, 2048			

Cables and connectors	Order no.
Preamsembled cables (suitable for type of connection L) PCB connector (female contacts), 12-pin single ended 2 m [6.56'] PVC cable	8.0000.6D91.0002.0097

Incremental encoders

Standard Motor-Line, optical	Sendix 5834 (tapered shaft)	SinCos
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Technical data

Mechanical characteristics		
Maximum speed		12000 min ⁻¹ , 5000 min ⁻¹ (continuous)
Starting torque – at 20 °C [68 °F]		< 0.01 Nm
Mass moment of inertia		3.0 x 10 ⁻⁶ kgm ²
Load capacity of shaft	radial	80 N
	axial	40 N
Weight		approx. 0.45 kg [15.85 oz]
Protection acc. to EN 60529		IP65
Working temperature range		-40 °C ... +90 °C [-40 °F ... +194 °F] ¹⁾
Materials	tapered shaft	stainless steel
	flange	aluminum
	housing	zinc die-cast
	cable	PVC
Shock resistance acc. to EN 60068-2-27		2500 m/s ² , 6 ms
Vibration resistance acc. to EN 60068-2-6		100 m/s ² , 55 ... 2000 Hz

SinCos interface		
Max. frequency -3dB		400 kHz
Signal level		1 Vpp (±10 %)
Short circuit proof		yes ²⁾
Pulse rate		1024 / 2048 ppr

Approvals		
UL compliant in accordance with		File no. E224618
CE compliant in accordance with		
EMC Directive	2014/30/EU	
RoHS Directive	2011/65/EU	

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	

Terminal assignment

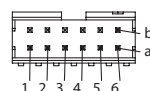
Output circuit	Type of connection	Cable (isolate unused cores individually before initial start-up)							
1, 2	E, F	Signal:	0 V	+V	A	$\bar{A}$	B	$\bar{B}$	$\perp$
		Core color:	WH	BN	GN	YE	GY	PK	shield

Output circuit	Type of connection	PCB connector (male contact), 12-pin												
1, 2	L	Signal:	0 V	+V	A	$\bar{A}$	B	$\bar{B}$	d.n.c.	d.n.c.	d.n.c.	d.n.c.	d.n.c.	d.n.c.
		Pin:	4b	1b	2a	5b	4a	3b	1a	2b	3a	5a	6a	6b

+V: Supply voltage encoder +V DC
 0 V: Supply voltage encoder ground GND (0 V)
 A, $\bar{A}$: Cosine signal
 B, $\bar{B}$: Sine signal
 d.n.c.: do not connect (used internally)

Top view of mating side, male contact base

Type of connection L
 FCI Minitek connector (male contact),
 double-row, 12-pin (98424-F52-12-LF)



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, supply voltage correctly applied.

Incremental encoders

Standard Motor-Line, optical

Sendix 5834 (tapered shaft)

SinCos

Dimensions tapered shaft version

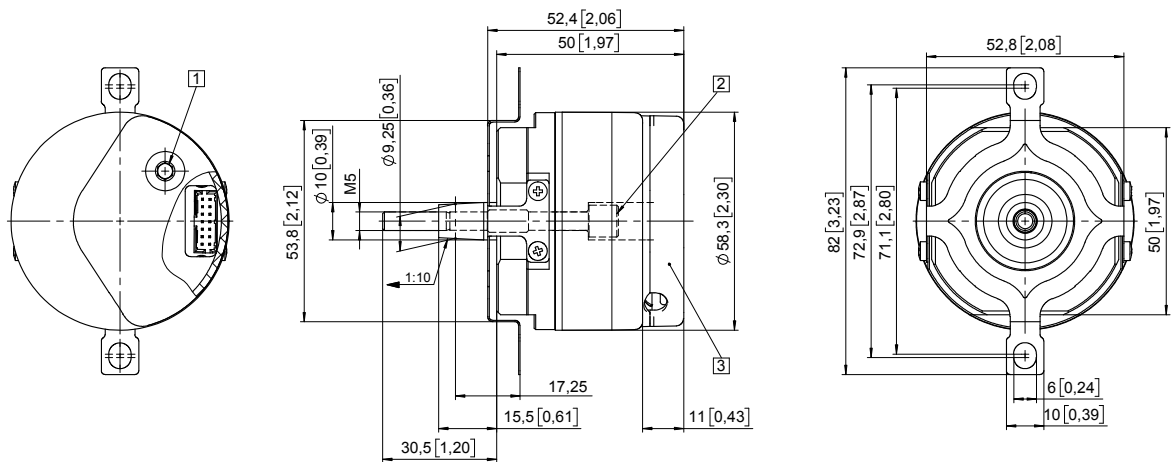
Dimensions in mm [inch]

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

Flange type G

(with tapered shaft K and PCB connector)

- 1 Recommended torque for screw M6 (SW 4) 2.0 ^{+0.5} Nm
- 2 Recommended torque for central screw M5 (SW 4) 3.0 ^{+0.5} Nm (tapered shaft)
- 3 Sealing cap for tangential cable outlet



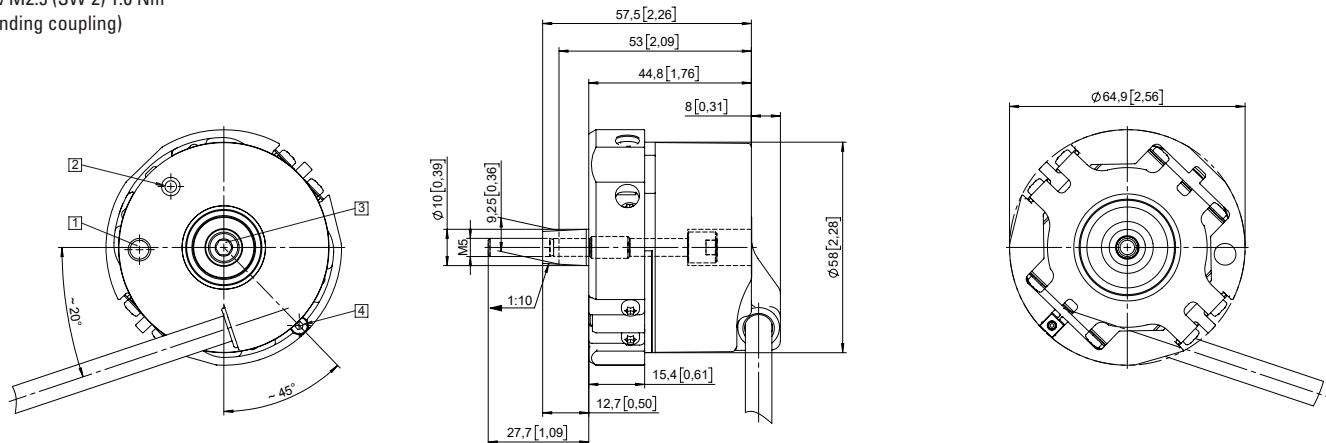
Flange with expanding coupling,

$\varnothing$ 65 [2.56"]

Flange type H

(with tapered shaft K and tangential cable)

- 1 Status-LED
- 2 SET button
- 3 Recommended torque for central screw M5 (SW 4) 3.0 ^{+0.5} Nm (tapered shaft)
- 4 Recommended torque for tightening screw M2.5 (SW 2) 1.0 Nm (expanding coupling)



Incremental encoders

Standard sine wave output, SIL3/PLe, optical	Sendix 5814FS3 / 5834FS3 (shaft / hollow shaft)	SinCos
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The incremental encoders 5814FS3 and 5834FS3 of the Sendix family are suited for use in safety-related applications up to SIL3 according to EN 61800-5-2 or PLe to EN ISO 13849-1.

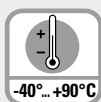
These encoders are particularly suited for applications in the field of safe drive technology.



Safety-Lock™



High rotational speed



Temperature range



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 SIL3 acc. to EN 61800-5-2.
- Suitable for applications up to PLe 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	8.5814FS3 . XXXX . 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 / supply voltage

- 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.: 8.5814FS3.122A.2048.0030 (for cable length 3 m)

e Pulse rate

1024, 2048

Optional on request

- Ex 2/22 (only for variants with IP67) ¹⁾
- surface protection salt spray

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

Incremental encoders

Standard sine wave output, SIL3/PLe, optical	Sendix 5814FS3 / 5834FS3 (shaft / hollow shaft)	SinCos
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Order code Hollow shaft	8.5834FS3 Type	. XXXXX . XXXX a b c d e
a Flange 9 = with torque stop FS, flexible, IP65 J = with torque stop FS, flexible, IP67 A = with torque stop FS, rigid, IP65 (incl. torque pin FS) K = with torque stop FS, rigid, IP67 (incl. torque pin FS) B = with stator coupling FS, ø 63 mm [2.48"], IP65 L = with stator coupling FS, ø 63 mm [2.48"], IP67 b Through hollow shaft 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"] c Output circuit / supply voltage 1 = SinCos / 5 V DC 2 = SinCos / 10 ... 30 V DC		
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-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.: 8.5834FS3.B42B.2048.0030 (for cable length 3 m) e Pulse rate 1024, 2048 <i>Optional on request</i> - Ex 2/22 (only for variants with IP67) ¹⁾ not for type of connection E, F - surface protection salt spray		

Accessories		Order no.
EMC shield terminal	for top-hat rail mounting	8.0000.4G06.0312
Screw retention	Loctite 243, 5 ml	8.0000.4G05.0000
Bellows coupling, safety-oriented		
Safety modules		
Safety-M compact		

Cables and connectors		Order no.
Preassembled cables	M12 female connector with coupling nut, 8-pin, A coded, straight single ended 2 m [6.56'] PUR cable ²⁾	05.00.60E1.8211.002M
	M12 female connector with coupling nut, 12-pin, cw single ended 2 m [6.56'] PVC cable ²⁾	8.0000.6901.0002
Connectors	M12 female connector with coupling nut, 8-pin, A coded, straight (metal)	05.CMB 8181-0
	M12 female connector with coupling nut, 12-pin, cw	8.0000.5012.0000

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

2) Other lengths available.

Incremental encoders

Standard sine wave output, SIL3/PLe, optical	Sendix 5814FS3 / 5834FS3 (shaft / hollow shaft)	SinCos
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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 61800-5-2 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 (Cat. 4)
PFH_a value³⁾	1.09 x 10 ⁻⁸ h ⁻¹
Mission time / Proof test interval	20 years
Relevant standards	EN ISO 13849-1:2015; EN ISO 13849-2:2012; EN 61800-5-2:2007

Mechanical characteristics

Maximum speed, shaft version		
up to 70 °C [158 °F]	12000 min ⁻¹ , 10000 min ⁻¹ (continuous)	
up to T _{max}	8000 min ⁻¹ , 5000 min ⁻¹ (continuous)	
Maximum speed, hollow shaft version		
up to 70 °C [158 °F]	9000 min ⁻¹ , 6000 min ⁻¹ (continuous)	
up to T _{max}	6000 min ⁻¹ , 3000 min ⁻¹ (continuous)	
Starting torque – at 20 °C [68 °F]		
shaft version	< 0.01 Nm	
hollow shaft version	< 0.03 Nm	
Mass moment of inertia		
shaft version	4.0 x 10 ⁻⁶ kgm ²	
hollow shaft version	7.0 x 10 ⁻⁶ kgm ²	
Insertion depth for shaft		
hollow shaft version	min. 34 mm [1.34"]	
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
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. to EN 60068-2-27		500 m/s ² , 11 ms
Vibration resistance acc. to EN 60068-2-6		200 m/s ² , 5 ... 2000 Hz

Electrical characteristics

Supply voltage	5 V DC (±5 %) or 10 ... 30 V DC
Power 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⁾

EMC

Relevant standards	EN 55011 class B:2009 / A1:2010 EN 61326-1:2013 EN 61326-3-1:2008
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SinCos interface

Max. frequency -3dB	400 kHz
Signal level	1 V _{pp} (±10 %)
Short circuit proof	yes ²⁾
Pulse rate	1024 / 2048 ppr

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

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, supply voltage correctly applied.

3) 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.

Incremental encoders

Standard sine wave output, SIL3/PLe, optical	Sendix 5814FS3 / 5834FS3 (shaft / hollow shaft)	SinCos
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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	$\bar{B}$
		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	$\bar{B}$
		Pin:	10	12	5	6	8	1
								PH ¹⁾

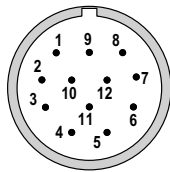
Output circuit	Type of connection	M12 connector, 8-pin						
1, 2	5, 6	Signal:	0 V	+V	A	$\bar{A}$	B	$\bar{B}$
		Pin:	1	2	3	4	5	6
								PH ¹⁾

+V: Supply voltage encoder +V DC
 0 V: Supply voltage encoder 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) PH = shield is attached to connector housing.

Incremental encoders

Standard sine wave output, SIL3/PLc, optical	Sendix 5814FS3 / 5834FS3 (shaft / hollow shaft)	SinCos
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Dimensions shaft version

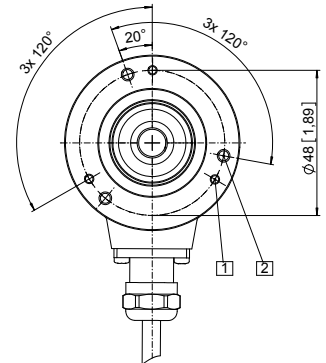
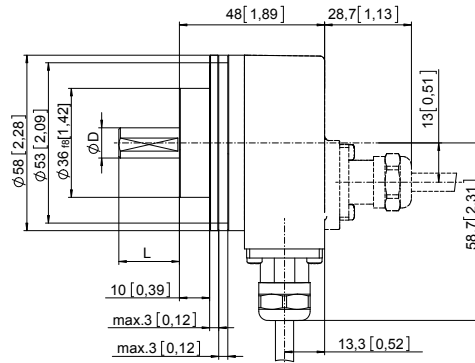
Dimensions in mm [inch]

Clamping flange, $\varnothing$ 58 [2.28]

Flange type 1 + 3 with shaft type 2

(drawing with cable)

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



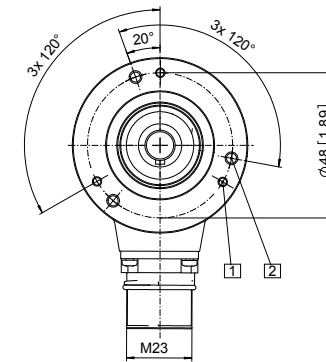
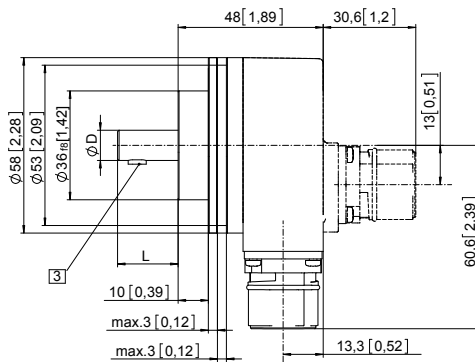
D	Fit	L
10 [0.39]	f7	20 [0.79]

Clamping flange, $\varnothing$ 58 [2.28]

Flange type 1 + 3 with shaft type A

(drawing with M23 connector)

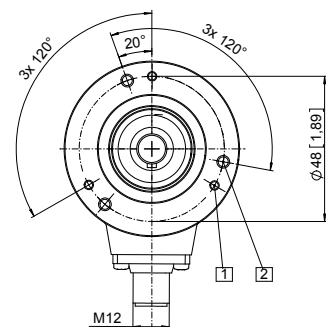
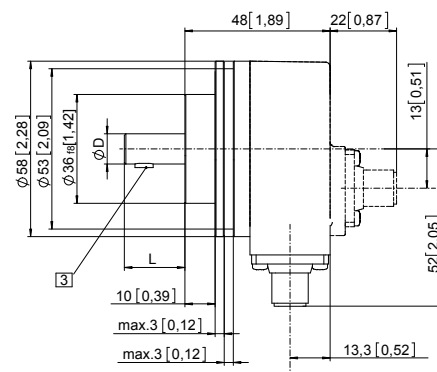
- 1 3 x M3, 6 [0.24] deep
- 2 3 x M4, 8 [0.32] deep
- 3 Feather key DIN 6885 - A - 3x3x6



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]

Incremental encoders

Standard
sine wave output, SIL3/PLe, optical

Sendix 5814FS3 / 5834FS3 (shaft / hollow shaft)

SinCos

Dimensions hollow shaft version

Dimensions in mm [inch]

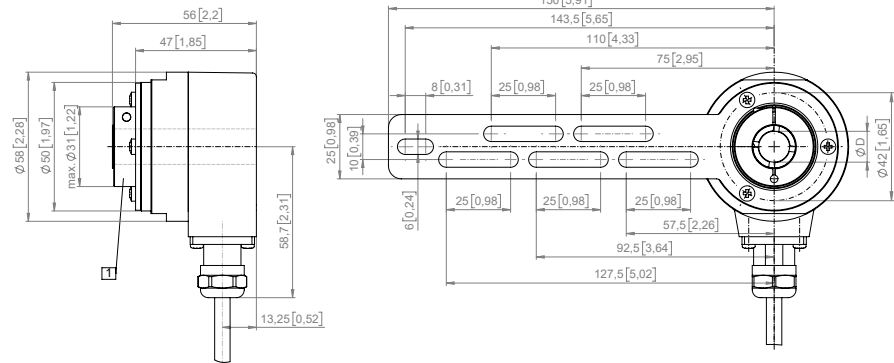
Flange with torque stop FS, rigid

Flange type A + K

Through hollow shaft

(drawing with cable)

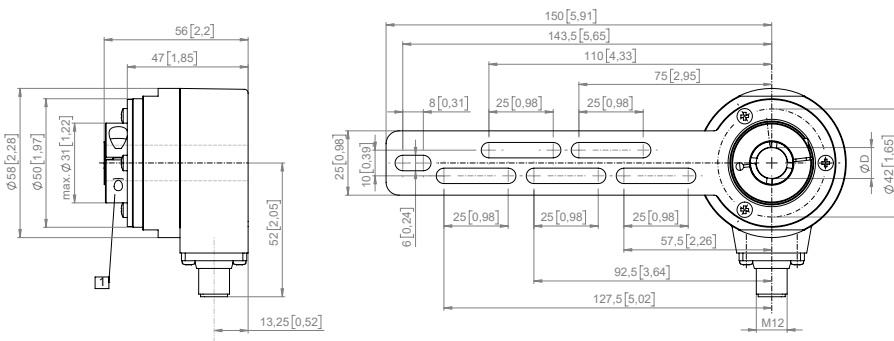
- 1 SW 3, recommended torque for the clamping ring 2.5 Nm



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

(drawing with M12 connector)

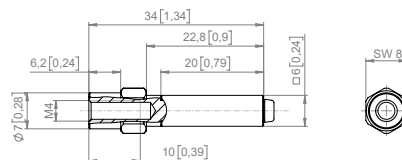
- 1 SW 3, recommended torque for the clamping ring 2.5 Nm



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

Torque pin FS

with rectangular sleeve and M4 thread
(included in scope of delivery)



Incremental encoders

Standard sine wave output, SIL3/PLc, optical	Sendix 5814FS3 / 5834FS3 (shaft / hollow shaft)	SinCos
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Dimensions hollow shaft version

Dimensions in mm [inch]

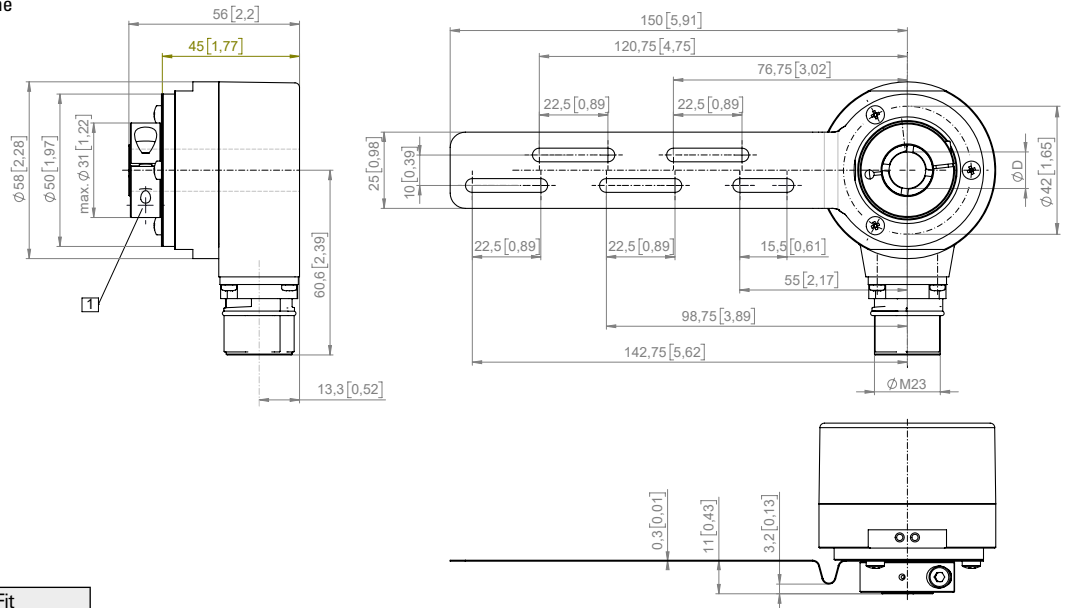
Flange with torque stop FS, flexible

Flange type 9 + J

Through hollow shaft

(drawing with M23 connector)

- 1 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 FS, ø 63 [2.48]

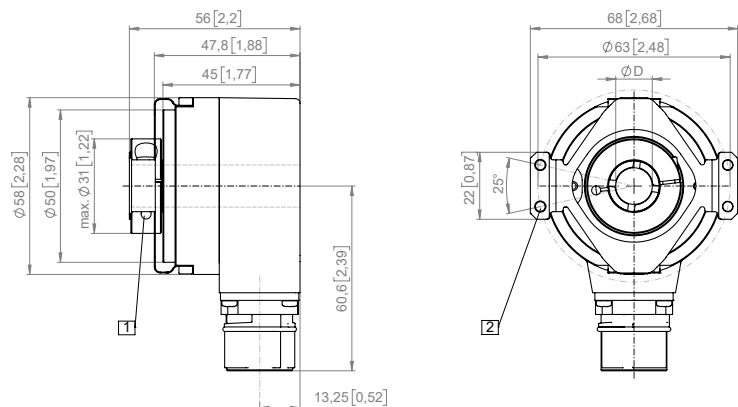
Flange type B + L

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

Incremental encoders

Standard
sine wave output, SIL3/PLe, optical

Sendix 5814FS3 / 5834FS3 (shaft / hollow shaft)

SinCos

Dimensions hollow shaft version

Dimensions in mm [inch]

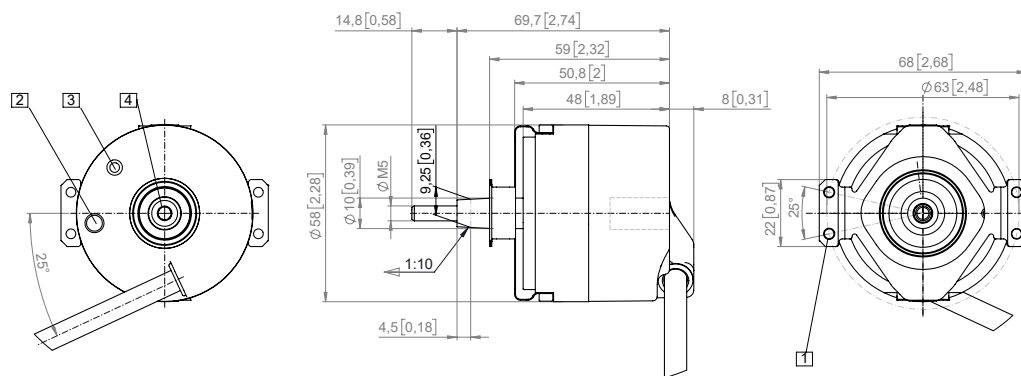
Flange with stator coupling FS, $\varnothing$ 63 [2.48]

Flange type B + L

Tapered shaft

(drawing with tangential cable outlet)

- 1 For (4x) M3 screw
- 2 Status-LED
- 3 SET button
- 4 Recommended torque for central screw M5 (SW 4) $3.0^{+0.5}$ Nm (tapered shaft)



Incremental encoders

Standard
sine wave output, SIL2/PLd, optical

Sendix 5814FS2 / 5834FS2 (shaft / hollow shaft)

SinCos



SIL2
Functional Safety
PLd

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.



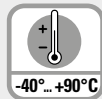
SinCos



Safety-Lock™



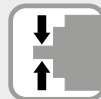
High rotational speed



Temperature range
-40°C...+90°C



High protection level
IP



High shaft load capacity



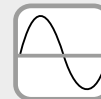
Shock / vibration resistant



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 . XXXX . 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 / supply voltage

- 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 (only for variants with IP67) ¹⁾
- surface protection salt spray

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

Incremental encoders

Standard sine wave output, SIL2/PLd, optical	Sendix 5814FS2 / 5834FS2 (shaft / hollow shaft)	SinCos
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Order code Hollow shaft	8.5834FS2 Type	. XXXXX . XXXX a b c d e
a Flange 9 = with torque stop FS, flexible, IP65 J = with torque stop FS, flexible, IP67 A = with torque stop FS, rigid, IP65 (incl. torque pin FS) K = with torque stop FS, rigid, IP67 (incl. torque pin FS) B = with stator coupling FS, ø 63 mm [2.48"], IP65 L = with stator coupling FS, ø 63 mm [2.48"], IP67 b Through hollow shaft 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"] c Output circuit / supply voltage 1 = SinCos / 5 V DC 2 = SinCos / 10 ... 30 V DC		
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-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) e Pulse rate 1024, 2048 <i>Optional on request</i> - Ex 2/22 (only for variants with IP67) ¹⁾ not for type of connection E, F - surface protection salt spray		

Accessories		Order no.
EMC shield terminal	for top-hat rail mounting	8.0000.4G06.0312
Screw retention	Loctite 243, 5 ml	8.0000.4G05.0000
Bellows coupling, safety-oriented		
Safety modules		
Safety-M compact		

Cables and connectors		Order no.
Preassembled cables	M12 female connector with coupling nut, 8-pin, A coded, straight single ended 2 m [6.56'] PUR cable ²⁾	05.00.60E1.8211.002M
	M12 female connector with coupling nut, 12-pin, cw single ended 2 m [6.56'] PVC cable ²⁾	8.0000.6901.0002
Connectors	M12 female connector with coupling nut, 8-pin, A coded, straight (metal)	05.CMB 8181-0
	M12 female connector with coupling nut, 12-pin, cw	8.0000.5012.0000

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

2) Other lengths available.

Incremental encoders

Standard sine wave output, SIL2/PLd, optical	Sendix 5814FS2 / 5834FS2 (shaft / hollow shaft)	SinCos
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Technical data

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)	
PFH _a value ³⁾	2.16 x 10 ⁻⁸ h ⁻¹	
Mission time / Proof test interval	20 years	
Relevant standards	EN ISO 13849-1:2015; EN ISO 13849-2:2012; EN 61800-5-2:2007	
Mechanical characteristics		
Maximum speed, shaft version	up to 70 °C [158 °F] 12000 min ⁻¹ , 10000 min ⁻¹ (continuous) up to T _{max} 8000 min ⁻¹ , 5000 min ⁻¹ (continuous)	
Maximum speed, hollow shaft version	up to 70 °C [158 °F] 9000 min ⁻¹ , 6000 min ⁻¹ (continuous) up to T _{max} 6000 min ⁻¹ , 3000 min ⁻¹ (continuous)	
Starting torque – at 20 °C [68 °F]	shaft version < 0.01 Nm hollow shaft version < 0.03 Nm	
Mass moment of inertia	shaft version 4.0 x 10 ⁻⁶ kgm ² hollow shaft version 7.0 x 10 ⁻⁶ kgm ²	
Insertion depth for shaft	hollow shaft version min. 34 mm [1.34“]	
Load capacity of shaft	radial axial	80 N 40 N
Weight	approx. 0.45 kg [15.87 oz]	
Protection acc. to EN 60529	IP65, IP67	
Working temperature range	-40 °C ... +90 °C [-40 °F ... +194 °F] ¹⁾	
Materials	shaft / hollow shaft flange housing cable	stainless steel aluminum zinc die-cast PVC (PUR for Ex 2/22)
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 , 5 ... 2000 Hz	

Electrical characteristics		
Supply voltage	5 V DC (±5 %) or 10 ... 30 V DC	
Power consumption (no load)	5 V DC 10 ... 30 V DC	max. 70 mA max. 45 mA
Reverse polarity protection of the supply voltage	yes	
Short circuit proof outputs	yes ²⁾	
EMC		
Relevant standards	EN 55011 class B:2009 / A1:2010 EN 61326-1:2013 EN 61326-3-1:2008	
SinCos interface		
Max. frequency -3dB	400 kHz	
Signal level	1 V _{pp} (±10 %)	
Short circuit proof	yes ²⁾	
Pulse rate	1024 / 2048 ppr	
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	

- 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, supply voltage correctly applied.
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.

Incremental encoders

Standard
sine wave output, SIL2/PLd, optical

Sendix 5814FS2 / 5834FS2 (shaft / hollow shaft)

SinCos

Terminal assignment

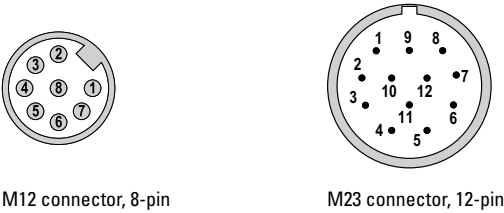
Output circuit	Type of connection	Cable (isolate unused cores individually before initial start-up)							
1, 2	1, 2, A, B, E, F	Signal:	0 V	+V	A	$\bar{A}$	B	$\bar{B}$	$\perp$
		Core color:	WH	BN	GN	YE	GY	PK	shield

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 ¹⁾

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 ¹⁾

- +V: Supply voltage encoder +V DC
- 0 V: Supply voltage encoder 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



1) PH = shield is attached to connector housing.

Incremental encoders

Standard sine wave output, SIL2/PLd, optical	Sendix 5814FS2 / 5834FS2 (shaft / hollow shaft)	SinCos
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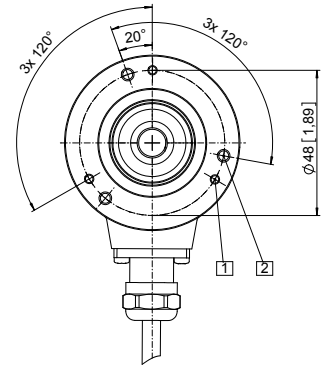
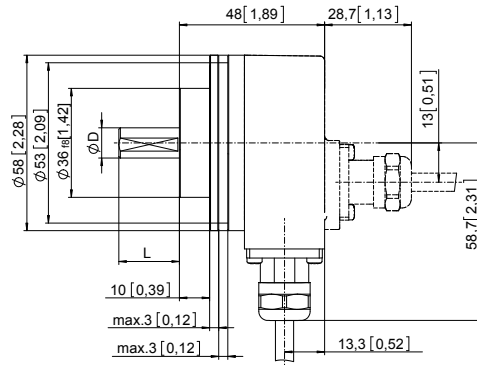
Dimensions shaft version

Dimensions in mm [inch]

Clamping flange, ø 58 [2.28]

Flange type 1 + 3 with shaft type 2
(drawing with cable)

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

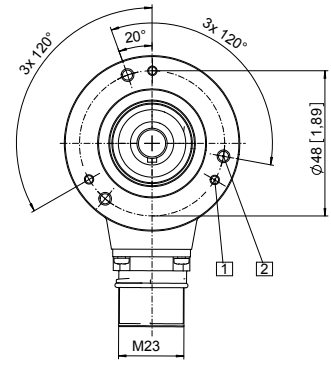
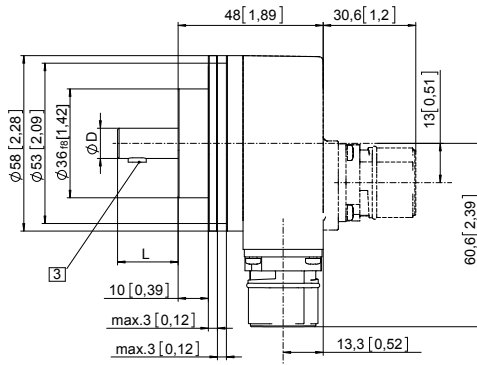


D	Fit	L
10 [0.39]	f7	20 [0.79]

Clamping flange, ø 58 [2.28]

Flange type 1 + 3 with shaft type A
(drawing with M23 connector)

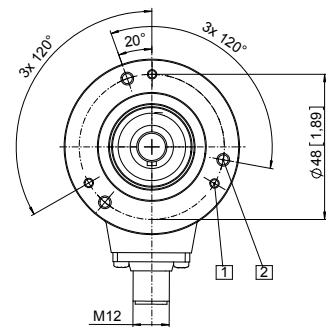
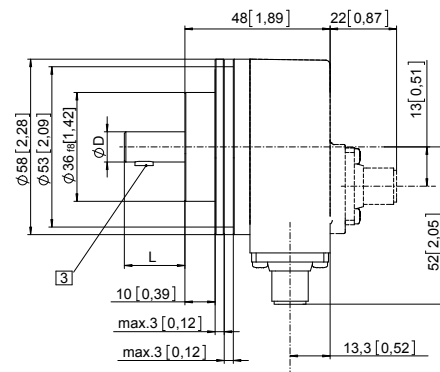
- 1 3 x M3, 6 [0.24] deep
- 2 3 x M4, 8 [0.32] deep
- 3 Feather key DIN 6885 - A - 3x3x6



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]

Incremental encoders

Standard sine wave output, SIL2/PLd, optical	Sendix 5814FS2 / 5834FS2 (shaft / hollow shaft)	SinCos
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Dimensions hollow shaft version

Dimensions in mm [inch]

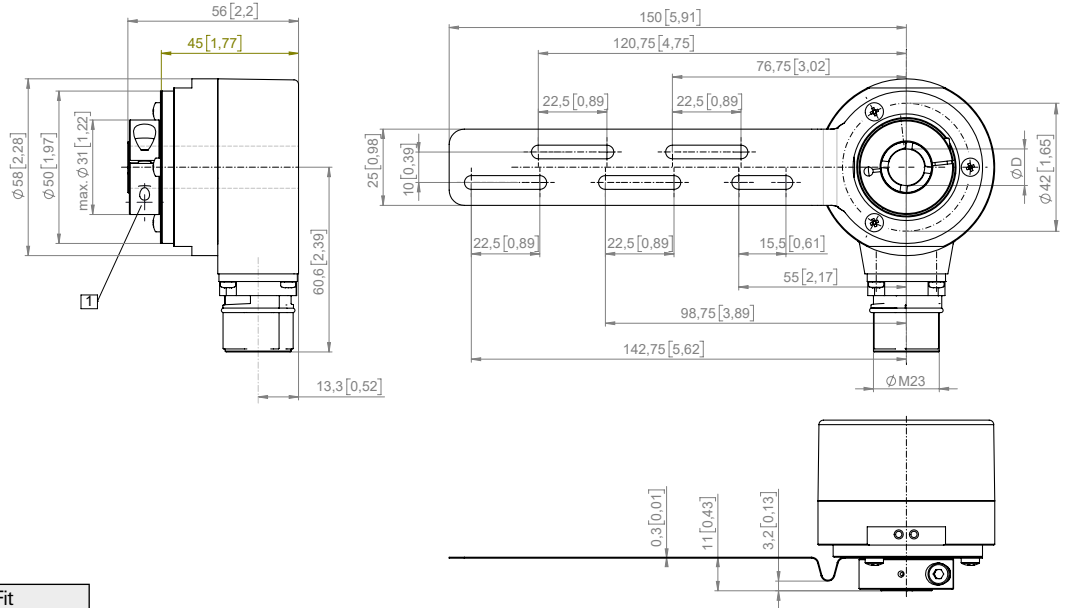
Flange with torque stop FS, flexible

Flange type 9 + J

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 FS, ø 63 [2.48]

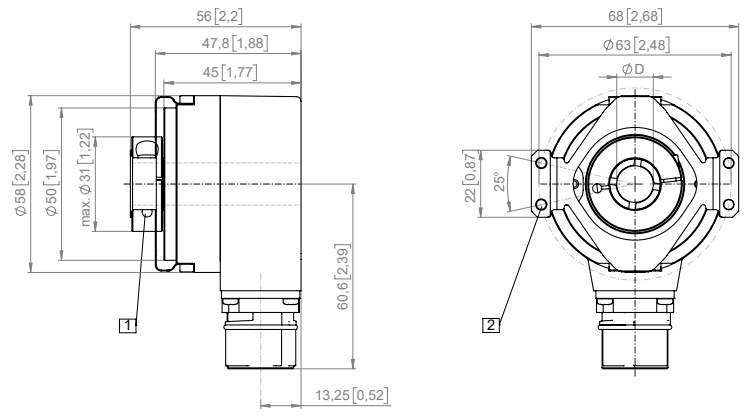
Flange type B + L

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

Incremental encoders

Standard
sine wave output, SIL2/PLd, optical

Sendix 5814FS2 / 5834FS2 (shaft / hollow shaft)

SinCos

Dimensions hollow shaft version

Dimensions in mm [inch]

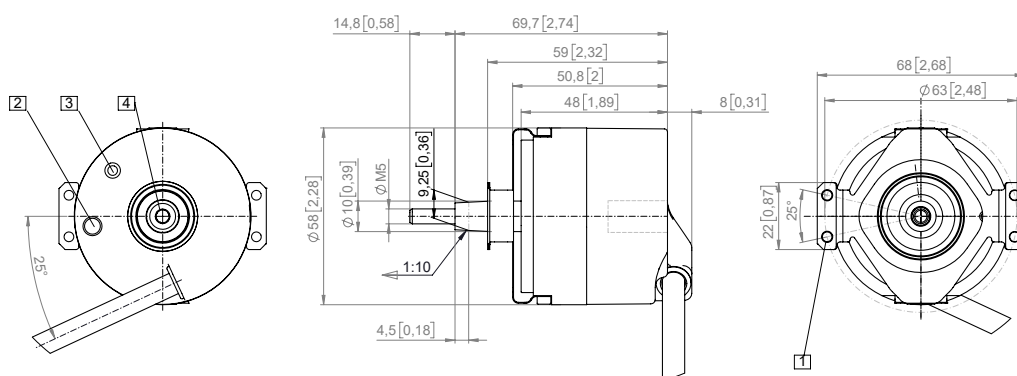
Flange with stator coupling FS, $\varnothing$ 63 [2.48]

Flange type B + L

Tapered shaft

(drawing with tangential cable outlet)

- 1** For (4x) M3 screw
- 2** Status-LED
- 3** SET button
- 4** Recommended torque for central screw M5 (SW 4) $3.0^{+0.5}$ Nm (tapered shaft)



Incremental encoders

Standard
sine wave output, highly interpolable, optical

Sendix 5814 / 5834 (shaft / hollow shaft)

SinCos



The incremental encoders Sendix 5814 and 5834 with SinCos interface are particularly suited for applications in the field of drive technology.

Thanks to their high signal quality, they are optimally suited for further interpolation.



Powerful

- With incremental SinCos tracks.
- Very high signal quality.
- Suited for motor feedback applications.

Flexible

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

Order code 8.5814 . 1 2 XX . XXXX
Shaft version Type a b c d e

a Flange
1 = clamping flange, ø 58 mm [2.28"]

b Shaft (ø x L)
2 = 10 x 20 mm [0.39 x 0.79"], with flat

c Output circuit / supply voltage
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 *)
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.: 8.5814.122A.2048.0030 (for cable length 3 m)

e Pulse rate
1024, 2048
Optional on request
- Ex 2/22 ¹⁾
- surface protection salt spray tested

Order code 8.5834 . XXXX . XXXX
Hollow shaft Type a b c d e

a Flange
1 = with spring element, long
5 = with stator coupling, ø 63 mm [2.48"]

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"
Tapered shaft
K = ø 10 mm [0.39"]

c Output circuit / supply voltage
1 = SinCos / 5 V DC
2 = SinCos / 10 ... 30 V DC

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 *)
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.: 8.5834.142B.2048.0030 (for cable length 3 m)

e Pulse rate
1024, 2048
Optional on request
- Ex 2/22
(not for type of connection E, F) ¹⁾
- surface protection salt spray tested

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

Incremental encoders

Standard sine wave output, highly interpolable, optical		Sendix 5814 / 5834 (shaft / hollow shaft)	SinCos
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
Connectors	M12 female connector with coupling nut, 8-pin, A coded, straight (metal)		05.CMB 8181-0

Technical data

Mechanical characteristics		
Maximum speed	12000 min ⁻¹ , 5000 min ⁻¹ (continuous)	
Starting torque – at 20 °C [68 °F]	< 0.01 Nm	
Mass moment of inertia	shaft	4.0 x 10 ⁻⁶ kgm ²
	hollow shaft	7.0 x 10 ⁻⁶ kgm ²
Load capacity of shaft	radial	80 N
	axial	40 N
Weight	approx. 0.45 kg [15.85 oz]	
Protection acc. to EN 60529	IP65	
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. to EN 60068-2-27	2500 m/s ² , 6 ms	
Vibration resistance acc. to EN 60068-2-6	100 m/s ² , 55 ... 2000 Hz	

SinCos interface	
Max. frequency -3dB	400 kHz
Signal level	1 V _{pp} (±10 %)
Short circuit proof	yes ²⁾
Pulse rate	1024 / 2048 ppr

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)

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	

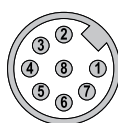
Terminal assignment

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	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 ³⁾

+V: Supply voltage encoder +V DC
 0 V: Supply voltage encoder 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

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

Incremental encoders

Standard sine wave output, highly interpolable, optical	Sendix 5814 / 5834 (shaft / hollow shaft)	SinCos
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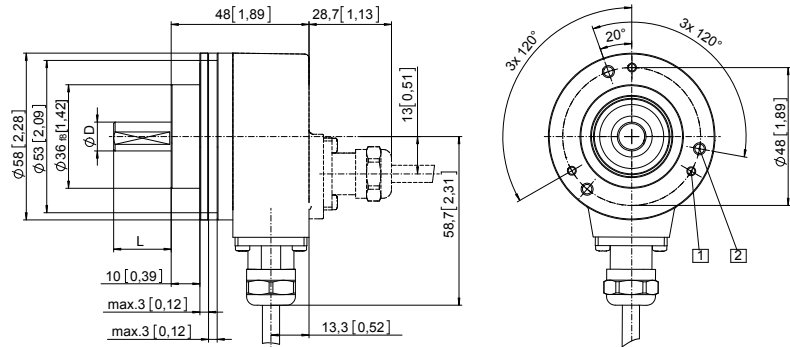
Dimensions shaft version

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

axial und radial)



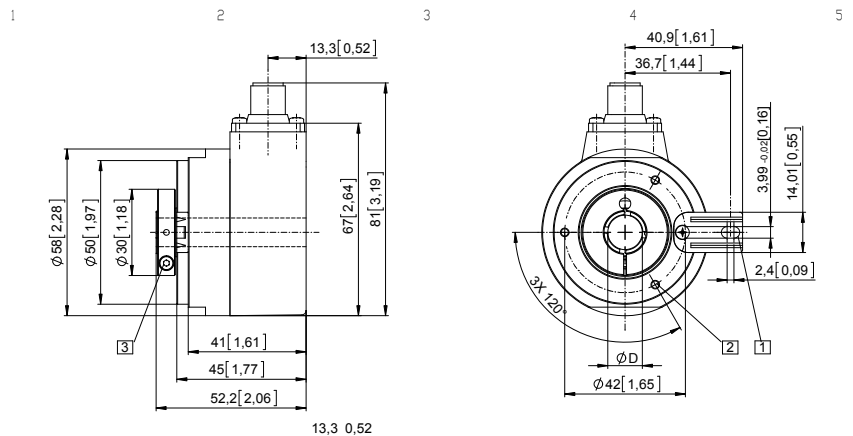
D	Fit	L
10 [0.39]	f7	20 [0.79]

Dimensions hollow shaft version

Dimensions in mm [inch]

Flange with spring element, long
Flange type 1
 (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 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

Incremental encoders

Standard
sine wave output, highly interpolable, optical

Sendix 5814 / 5834 (shaft / hollow shaft)

SinCos

Dimensions hollow shaft version

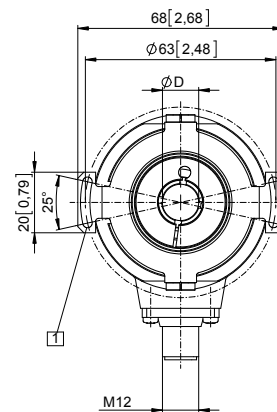
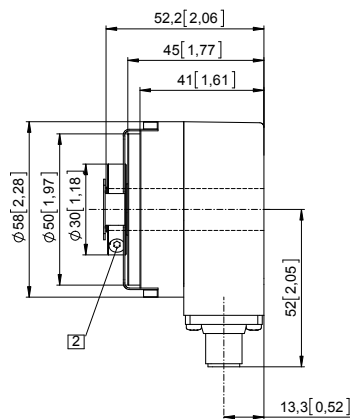
Dimensions in mm [inch]

**Flange with stator coupling, ø 63 [2.48]
and hollow shaft**

Flange type 5

(drawing with M12 connector)

- 1 For (4x) M3 screw
- 2 Recommended torque for the clamping ring 0.6 Nm



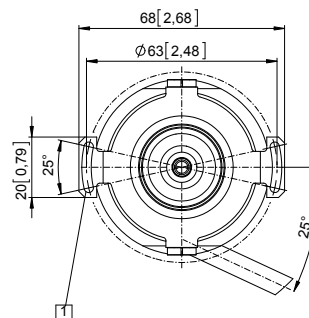
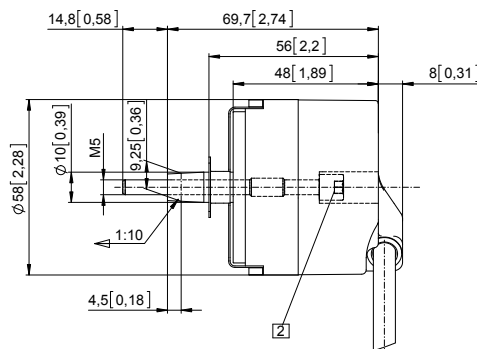
D	Fit
10 [0.39]	H7
12 [0.47]	H7
14 [0.55]	H7
15 [0.59]	H7
3/8"	H7
1/2"	H7

**Flange with stator coupling, ø 63 [2.48]
and tapered shaft**

Flange type 5

(drawing with tangential cable outlet)

- 1 For (4x) M3 screw
- 2 Recommended torque for central screw M5 (SW 4) 3.0 ^{+0.5} Nm (tapered shaft)



Incremental encoders

**Standard
high resolution, optical**

5805 / 5825 (shaft / hollow shaft)

Push-pull / RS422



The incremental encoders type 5805 / 5825 offer resolutions up to max. 36000 pulses per revolution.

They are thus perfect for use in applications where a very high level of accuracy is required.



High rotational speed



Temperature range
-20° ... +85°C



High protection level
IP



High shaft load capacity



Shock / vibration resistant



Magnetic field proof



Short-circuit proof



Optical sensor

High performance

- High shaft loading capability.
- Maximum speed up to 12000 revolutions per minute.
- High IP protection up to max. IP66.

Many variants

- With RS422 or push-pull interface.
- With cable or connector.

Order code

Shaft version

8.5805

Type

. **XXXXX** . **XXXXX**
a b c d e

a Flange

- 1 = clamping flange ø 58 mm [2.28"]
- 2 = synchro flange ø 58 mm [2.28"]

b Shaft (ø x L), with flat

- 1 = ø 6 x 10 mm [0.24 x 0.39"]
- 2 = ø 10 x 20 mm [0.39 x 0.79"]

c Output circuit / supply voltage

- 4 = RS422 (with inverted signal) / 5 V DC
- 5 = RS422 (with inverted signal) / 10 ... 30 V DC
- 6 = push-pull (with inverted signal) / 10 ... 30 V DC
- 7 = push-pull (without inverted signal) / 10 ... 30 V DC

d Type of connection

- 1 = axial cable, 1 m [3.28'] PUR
- A = axial cable, special length PUR *)
- 2 = radial cable, 1 m [3.28'] PUR
- B = radial cable, special length PUR *)
- 3 = axial M23 connector, 12-pin
- 5 = radial M23 connector, 12-pin
- T = axial M12 connector, 8-pin
- G = radial M12 connector, 8-pin

*) 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.: 8.5805.114A.6000.0030 (for cable length 3 m)

e Pulse rate

- 6000, 7200, 8000, 8192,
9000, 10000, 18000, 36000
(e.g. 18000 pulses => 18000)

Optional on request
- other pulse rates

Incremental encoders

Standard high resolution, optical	5805 / 5825 (shaft / hollow shaft)	Push-pull / RS422
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Order code	8.5825	.XXXXX	.XXXXX
Hollow shaft	Type	a b c d	e
a Flange 1 = with hollow shaft and spring element, short 2 = with blind hollow shaft and spring element, short 3 = with hollow shaft and stator coupling, $\varnothing$ 65 mm [2.56"] 4 = with blind hollow shaft and stator coupling, $\varnothing$ 65 mm [2.56"] b Hollow shaft (insertion depth blind hollow shaft with flange 2 and 4 max. 30 mm [1.18"]) 1 = $\varnothing$ 6 mm [0.24"], IP40 2 = $\varnothing$ 6 mm [0.24"], IP66 3 = $\varnothing$ 8 mm [0.32"], IP40 4 = $\varnothing$ 8 mm [0.32"], IP66 5 = $\varnothing$ 10 mm [0.39"], IP40 6 = $\varnothing$ 10 mm [0.39"], IP66 7 = $\varnothing$ 12 mm [0.47"], IP40 8 = $\varnothing$ 12 mm [0.47"], IP66 c Output circuit / supply voltage 1 = RS422 (with inverted signal) / 5 V DC 4 = RS422 (with inverted signal) / 10 ... 30 V DC 2 = push-pull (without inverted signal) / 10 ... 30 V DC 3 = push-pull (with inverted signal) / 10 ... 30 V DC d Type of connection 1 = radial cable, 1 m [3.28'] PVC A = radial cable, special length PVC *) 2 = radial M23 connector, 12-pin C = radial M12 connector, 8-pin e Pulse rate 6000, 7200, 8000, 8192, 9000, 10000, 18000, 36000 (e.g. 18000 pulses => 18000) Optional on request - other pulse rates *) Available special lengths (connection types A): 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.: 8.5825.114A.6000.0030 (for cable length 3 m)			

Mounting accessory for shaft encoders		Order no.
Coupling	bellows coupling $\varnothing$ 19 mm [0.75"] for shaft 6 mm [0.24"]	8.0000.1102.0606
	bellows coupling $\varnothing$ 19 mm [0.75"] for shaft 10 mm [0.39"]	8.0000.1102.1010

Mounting accessory for hollow shaft encoders		Order no.
Dimensions in mm [inch]		
Torque pin, $\varnothing$ 4 mm for flange with spring element (flange type 1 + 2)	with fixing thread 	8.0010.4700.0000

Stator coupling, $\varnothing$ 63 mm [2.48"]		8.0010.4D00.0000
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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'] PUR cable	8.0000.6101.0002
	M23 female connector with coupling nut, 12-pin, cw single ended 2 m [6.56'] PVC cable	8.0000.6901.0002
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

Incremental encoders

Standard high resolution, optical	5805 / 5825 (shaft / hollow shaft)	Push-pull / RS422
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Technical data

Mechanical characteristics		
Speed	shaft IP65	12000 min ⁻¹
	hollow shaft IP40	12000 min ⁻¹
	hollow shaft IP66 ¹⁾	6000 min ⁻¹
Mass moment of inertia	shaft	approx. 1.8 x 10 ⁻⁶ kgm ²
	hollow shaft	approx. 6.0 x 10 ⁻⁶ kgm ²
Starting torque – at 20 °C [68 °F]		
	shaft IP65 / hollow shaft IP40	< 0.01 Nm
	hollow shaft IP66	< 0.05 Nm
Load capacity of shaft	radial	80 N
	axial	40 N
Weight		approx. 0.4 kg [14.11 oz]
Protection acc. to EN 60529		
	shaft	IP65
	hollow shaft without seal	IP40
	hollow shaft with seal	IP66
Working temperature range		
	shaft IP65 / hollow shaft IP40	-20 °C ... +105 °C [-4 °F ... +221 °F]
	hollow shaft IP66	-20 °C ... +90 °C [-4 °F ... +194 °F]
Material	shaft	stainless steel H7
Shock resistance acc. to EN 60068-2-27		1000 m/s ² , 6 ms
Vibration resistance acc. to EN 60068-2-6		100 m/s ² , 10 ... 2000 Hz

Electrical characteristics			
Output circuit		RS422 (TTL compatible)	Push-pull
Supply voltage		5 V DC (±5 %) or 10 ... 30 V DC	10 ... 30 V DC
Power consumption (no load)			
without inverted signal		–	typ. 90 mA / max. 135 mA
with inverted signal		typ. 70 mA/max. 120 mA	typ. 115 mA/max. 160 mA
Permissible load / channel		max. +/- 20 mA	max. +/- 30 mA
Pulse frequency		max. 800 kHz	max. 600 kHz
Signal level			
HIGH		min. 2.5 V	min. +V - 2.5 V
LOW		max. 0.5 V	max. 2.0 V
Rising edge time t _r		max. 200 ns	max. 1 µs
Falling edge time t _f		max. 200 ns	max. 1 µs
Short circuit proof outputs ²⁾		yes ³⁾	yes
Reverse polarity protection of the supply voltage		no; 10 ... 30 V DC: yes	yes

Approvals		
UL compliant in accordance with		File no. E224618
CE compliant in accordance with		
	EMC Directive	2014/30/EU
	RoHS Directive	2011/65/EU

- 1) For continuous operation max. 3000 min⁻¹, ventilated.
2) If supply voltage correctly applied.
3) Only one channel allowed to be shorted-out
at +V = 5 V DC short circuit to channel, 0 V, or +V is permitted.
at +V = 10 ... 30 V DC short circuit to channel or 0 V is permitted.

Incremental encoders

Standard high resolution, optical	5805 / 5825 (shaft / hollow shaft)	Push-pull / RS422
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Terminal assignment

Output circuit	Type / Type of connection	Cable (isolate unused cores individually before initial start-up)											
1, 2, 3, 4, 5, 6, 7	5805: 1, 2, A, B	Signal:	0 V	+V	0Vsens ²⁾	+Vsens ²⁾	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	$\perp$
		Core color:	WH 0,5 mm ²	BN 0,5 mm ²	WH	BN	GN	YE	GY	PK	BU	RD	shield

Output circuit	Type / Type of connection	Cable (isolate unused cores individually before initial start-up)											
1, 2, 3, 4, 5, 6, 7	5825: 1, A	Signal:	0 V	+V	0Vsens ²⁾	+Vsens ²⁾	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	$\perp$
		Core color:	WH	BN	GY/PK	BU/RD	GN	YE	GY	PK	BU	RD	shield

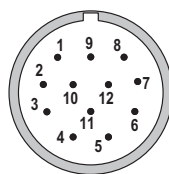
Output circuit	Type / Type of connection	M23 connector, 12-pin											
1, 2, 3, 4, 5, 6, 7	5805: 3, 5	Signal:	0 V	+V	0Vsens ²⁾	+Vsens ²⁾	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	$\perp$
	5825: 2	Pin:	10	12	11	2	5	6	8	1	3	4	PH ¹⁾

Output circuit	Type / Type of connection	M12 connector, 8-pin											
1, 2, 3, 4, 5, 6, 7	5805: G, T	Signal:	0 V	+V	0Vsens ²⁾	+Vsens ²⁾	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	$\perp$
	5825: C	Pin:	1	2			3	4	5	6	7	8	PH ¹⁾

Using RS422 outputs and long cable distances, a wave impedance has to be applied at each cable end.

+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.
 A, $\bar{A}$: Incremental output channel A
 B, $\bar{B}$: Incremental output channel B
 0, $\bar{0}$: Reference signal
 PH $\perp$: Plug connector housing (shield)

Top view of mating side, male contact base



M23 connector, 12-pin



M12 connector, 8-pin

1) PH = shield is attached to connector housing.

2) The sensor cables are connected to the supply voltage internally. If long feeder cables are involved they can be used to adjust or control the voltage at the encoder.

Incremental encoders

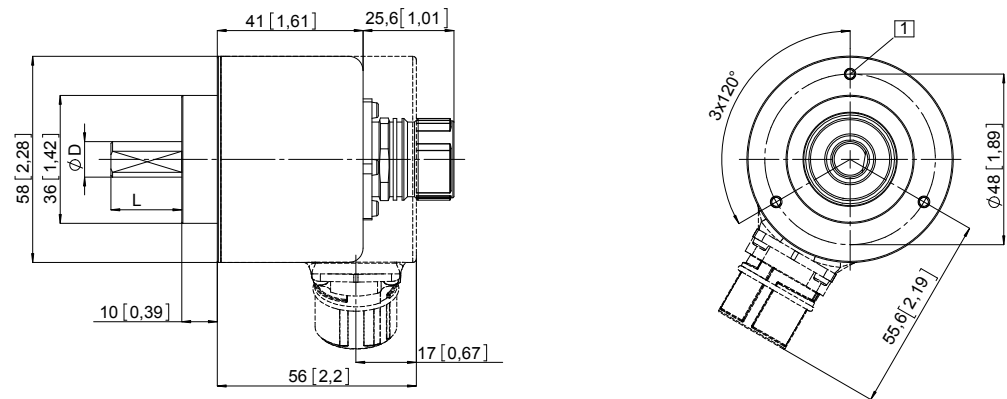
Standard high resolution, optical	5805 / 5825 (shaft / hollow shaft)	Push-pull / RS422
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Dimensions shaft version

Dimensions in mm [inch]

**Clamping flange, ø 58 [2.28]
Flange type 1**

1 3 x M3, 5 [0.2] deep

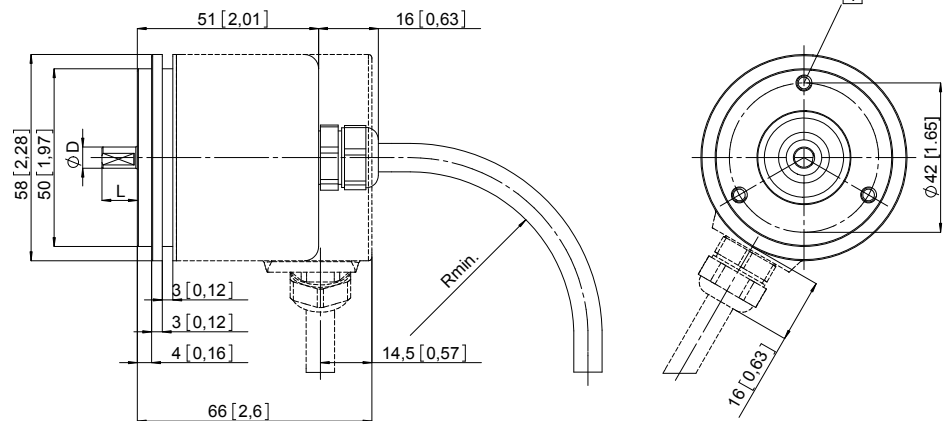


D	Fit	L
6 [0.24]	h7	10 [0.39]
10 [0.39]	f7	20 [0.79]

**Synchro flange, ø 58 [2.28]
Flange type 2**

1 3 x M4, 5 [0.2] deep

R_{min}:
- securely installed: 55 [2.17]
- flexibly installed: 70 [2.76]



D	Fit	L
6 [0.24]	h7	10 [0.39]
10 [0.39]	f7	20 [0.79]

Incremental encoders

Standard high resolution, optical	5805 / 5825 (shaft / hollow shaft)	Push-pull / RS422
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Dimensions hollow shaft version

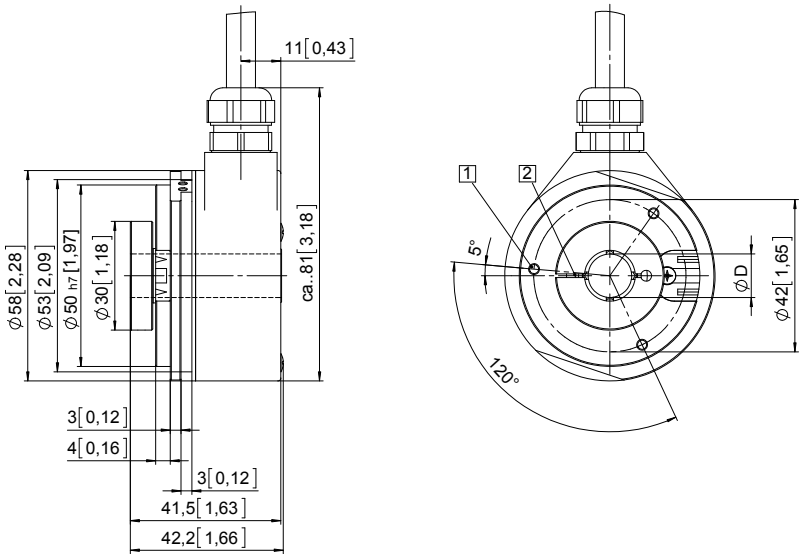
Dimensions in mm [inch]

Flange with spring element, short Flange type 1 and 2

- 1 3 x M3, 5 [0.2] deep
- 2 Recommended torque for the clamping ring 0.6 Nm

D	Fit
6 [0.24]	H7
8 [0.32]	H7
10 [0.39]	H7
12 [0.47]	H7

Insertion depth blind hollow shaft with flange 2:
max. 30 mm [1.18"]

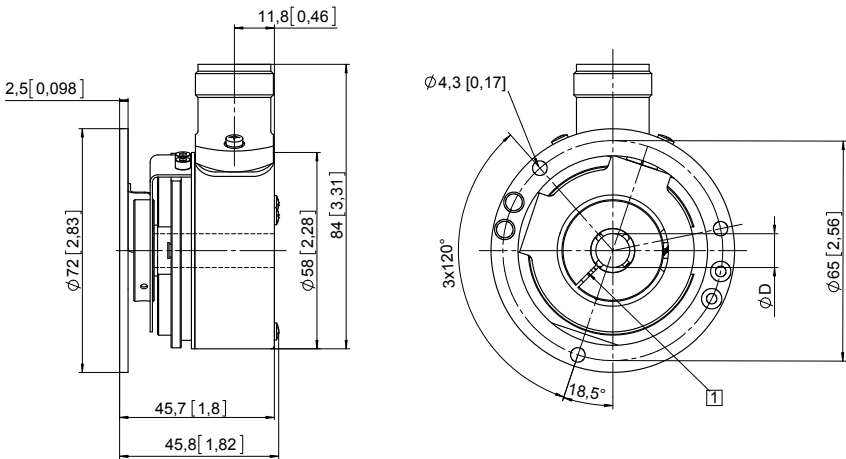


Flange with stator coupling, Ø 65 [2.56] Flange type 3 and 4

- 1 Recommended torque for the clamping ring 0.6 Nm

D	Fit
6 [0.24]	H7
8 [0.32]	H7
10 [0.39]	H7
12 [0.47]	H7

Min. insertion depth = 1.5 x D
Insertion depth blind hollow shaft with flange 4:
max. 30 mm [1.18"]



Incremental encoders

Standard
sine wave output, with reference signal, optical

5804 / 5824 (shaft / hollow shaft)

SinCos



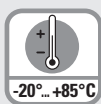
The incremental encoders type 5804 / 5824 offer a SinCos interface.

They are ideal for use in drive engineering.

These encoders are used preferably in applications for which a standard SinCos interface is sufficient.



High rotational speed



Temperature range
-20°...+85°C



High protection level
IP



High shaft load capacity



Shock / vibration resistant



Magnetic field proof



Short-circuit proof



Optical sensor

High performance

- High resolution up to 5000 pulses per revolution.
- Maximum speed up to 12000 revolutions per minute.
- High IP protection up to max. IP66.

Adaptable

- Shaft or hollow shaft version.
- With cable or connector.

Order code

Shaft version

8.5804

Type

. XXXX . XXXX
a b c d e

a Flange

- 1 = clamping flange ø 58 mm [2.28"]
- 2 = synchro flange ø 58 mm [2.28"]

b Shaft (ø x L), with flat

- 1 = ø 6 x 10 mm [0.24 x 0.39"]
- 2 = ø 10 x 20 mm [0.39 x 0.79"]

c Output circuit / supply voltage

- 1 = SinCos, 1 Vpp (with inverted signal) / 5 V DC
- 2 = SinCos, 1 Vpp (with inverted signal) / 10 ... 30 V DC

d Type of connection

- 1 = axial cable, 1 m [3.28'] TPE
- A = axial cable, special length TPE *)
- 2 = radial cable, 1 m [3.28'] TPE
- B = radial cable, special length TPE *)
- 3 = axial M23 connector, 12-pin
- 5 = radial M23 connector, 12-pin

*) 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.: 8.5804.111A.0512.0030 (for cable length 3 m)

e Pulse rate

512, 1000, 1024, 1200, 1250,
1500, 2000, 2048, 2500, 3000,
3600, 4000, 4096, 5000
(e.g. 512 pulses => 0512)

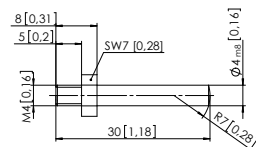
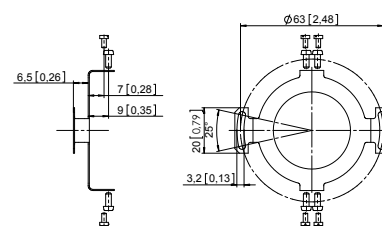
Optional on request
- other pulse rates

Incremental encoders

Standard sine wave output, with reference signal, optical	5804 / 5824 (shaft / hollow shaft)	SinCos
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Order code Hollow shaft	8.5824 Type	. XXXXX . XXXX a b c d e
a Flange 1 = with hollow shaft and spring element, short 2 = with blind hollow shaft and spring element, short 3 = with hollow shaft and stator coupling, ø 65 mm [2.56"] 4 = with blind hollow shaft and stator coupling, ø 65 mm [2.56"] b Hollow shaft (insertion depth blind hollow shaft with flange 2 and 4 max. 30 mm [1.18"]) 1 = ø 6 mm [0.24"], IP40 2 = ø 6 mm [0.24"], IP66 3 = ø 8 mm [0.32"], IP40 4 = ø 8 mm [0.32"], IP66 5 = ø 10 mm [0.39"], IP40 6 = ø 10 mm [0.39"], IP66 7 = ø 12 mm [0.47"], IP40 8 = ø 12 mm [0.47"], IP66 c Output circuit / supply voltage 1 = SinCos, 1 Vpp (with inverted signal) / 5 V DC 2 = SinCos, 1 Vpp (with inverted signal) / 10 ... 30 V DC d Type of connection 1 = radial cable, 1 m [3.28'] TPE A = radial cable, special length TPE *) 2 = radial M23 connector, 12-pin e Pulse rate 512, 1000, 1024, 1200, 1250, 1500, 2000, 2048, 2500, 3000, 3600, 4000, 4096, 5000 (e.g. 512 pulses => 0512) Optional on request - other pulse rates *) Available special lengths (connection types A): 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.: 8.5824.111A.0512.0030 (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		Order no.
Torque pin, ø 4 mm for flange with spring element (flange type 1 + 2)		8.0010.4700.0000
		8.0010.4D00.0000
Stator coupling, ø 63 mm [2.48"]		8.0010.4D00.0000
		

Cables and connectors		Order no.
Preassembled cables	M23 female connector with coupling nut, 12-pin, cw single ended 2 m [6.56'] PVC cable	8.0000.6E01.0002
	M23 female connector with coupling nut, 12-pin, cw	8.0000.5012.0000

Incremental encoders

Standard sine wave output, with reference signal, optical	5804 / 5824 (shaft / hollow shaft)	SinCos
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Technical data

Mechanical characteristics			Electrical characteristics		
Maximum Speed	shaft IP65	12000 min ⁻¹	Output circuit	SinCos, U = 1 Vpp	SinCos, U = 1 Vpp
	hollow shaft IP40	12000 min ⁻¹	Supply voltage	5 V DC (±5 %)	10 ... 30 V DC
	hollow shaft IP66 ¹⁾	6000 min ⁻¹	Power consumption with inverted signal (no load)	typ. 65 mA max. 110 mA	typ. 65 mA max. 110 mA
Mass moment of inertia	shaft	approx. 1.8 x 10 ⁻⁶ kgm ²	-3 dB frequency	≤ 180 kHz	≤ 180 kHz
	hollow shaft	approx. 6.0 x 10 ⁻⁶ kgm ²	Signal level		
Starting torque – at 20 °C [68 °F]			channels A/B	1 Vpp (±20 %)	1 Vpp (±20 %)
	shaft IP65 / hollow shaft IP40	< 0.01 Nm	channel 0	0.1 ... 1.2 V	0.1 ... 1.2 V
Load capacity of shaft	radial	80 N	Short circuit proof outputs ³⁾	yes	yes
	axial	40 N	Reverse polarity protection of the supply voltage	no	yes
Weight		approx. 0.4 kg [14.11 oz]			
Protection acc. to EN 60529	shaft	IP65			
	hollow shaft without seal	IP40			
	hollow shaft with seal	IP66			
Working temperature range					
	shaft IP65 / hollow shaft IP40	-20 °C ... +85 °C [-4 °F ... +185 °F] ²⁾			
	hollow shaft IP66	-20 °C ... +80 °C [-4 °F ... +176 °F] ²⁾			
Material	shaft	stainless steel H7			
Shock resistance acc. EN 60068-2-27		1000 m/s ² , 6 ms			
Vibration resistance acc. to EN 60068-2-6		100 m/s ² , 10 ... 2000 Hz			

Terminal assignment

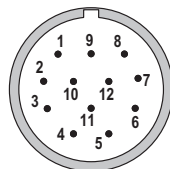
Output circuit	Type of connection	Cable (isolate unused cores individually before initial start-up)											
1, 2	5804: 1, 2, A, B	Signal:	0 V	+V	0Vsens ⁵⁾	+Vsens ⁵⁾	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	$\perp$
	5824: 1, A	Core color:	WH 0.5 mm ²	BN 0.5 mm ²	WH	BN	GN	YE	GY	PK	BU	RD	shield

Output circuit	Type of connection	M23 connector, 12-pin											
1, 2	5804: 3, 5	Signal:	0 V	+V	0Vsens ⁵⁾	+Vsens ⁵⁾	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	$\perp$
	5824: 2	Pin:	10	12	11	2	5	6	8	1	3	4	PH ⁴⁾

Using RS422 outputs and long cable distances, a wave impedance has to be applied at each cable end.

+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.
 A, $\bar{A}$: Cosine signal
 B, $\bar{B}$: Sine signal
 0, $\bar{0}$: Reference signal
 PH $\perp$: Plug connector housing (shield)

Top view of mating side, male contact base



M23 connector, 12-pin

- 1) For continuous operation max. 3000 min⁻¹, ventilated.
- 2) 70 °C [158 °F] for cable version.
- 3) If supply voltage correctly applied.
- 4) PH = shield is attached to connector housing.
- 5) The sensor cables are connected to the supply voltage internally. If long feeder cables are involved they can be used to adjust or control the voltage at the encoder.

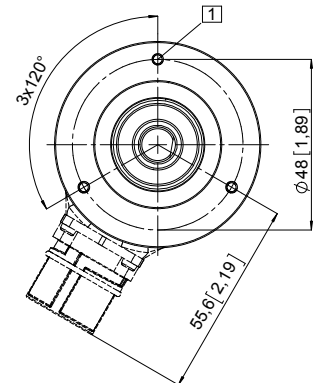
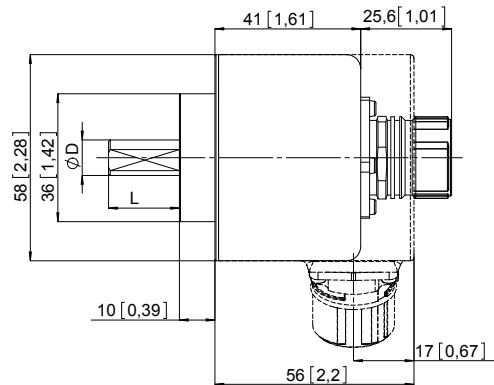
Incremental encoders

Standard
sine wave output, with reference signal, optical

SinCos

Clamping flange, $\varnothing 58$ [2.28]
Flange type 1

1 3 x M3, 5 [0.2] deep

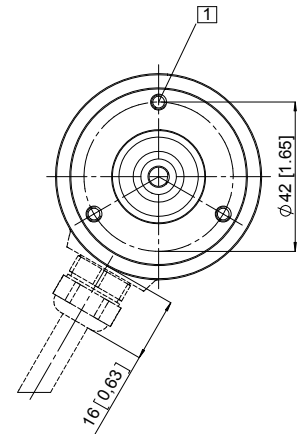
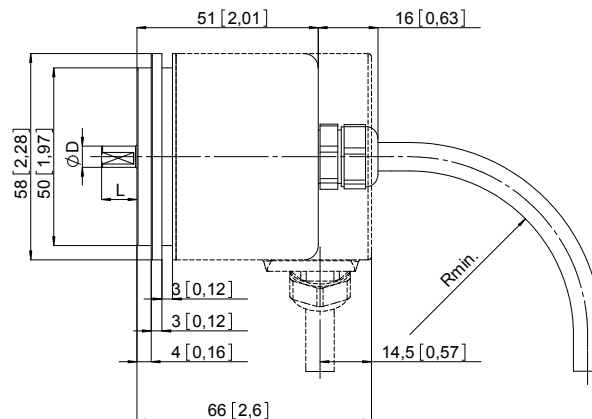


Dimensions	shaft version	L
6 [0.24]	h7	10 [0.39]
10 [0.39]	f7	20 [0.79]

Synchro flange, $\varnothing 58$ [2.28]
Flange type 2

1 3 x M4, 5 [0.2] deep

R_{min} :
- securely installed: 55 [2.17]
- flexibly installed: 70 [2.76]



D	Fit	L
6 [0.24]	h7	10 [0.39]
10 [0.39]	f7	20 [0.79]

Incremental encoders

Standard sine wave output, with reference signal, optical	5804 / 5824 (shaft / hollow shaft)	SinCos
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Dimensions hollow shaft version

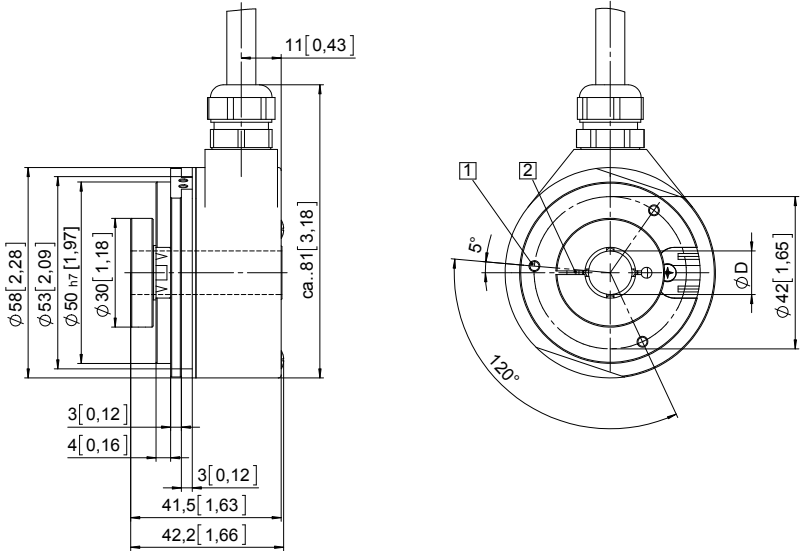
Dimensions in mm [inch]

Flange with spring element, short Flange type 1 and 2

- 1 3 x M3, 5 [0.2] deep
- 2 Recommended torque for the clamping ring 0.6 Nm

D	Fit
6 [0.24]	H7
8 [0.32]	H7
10 [0.39]	H7
12 [0.47]	H7

Insertion depth blind hollow shaft with flange 2:
max. 30 mm [1.18"]

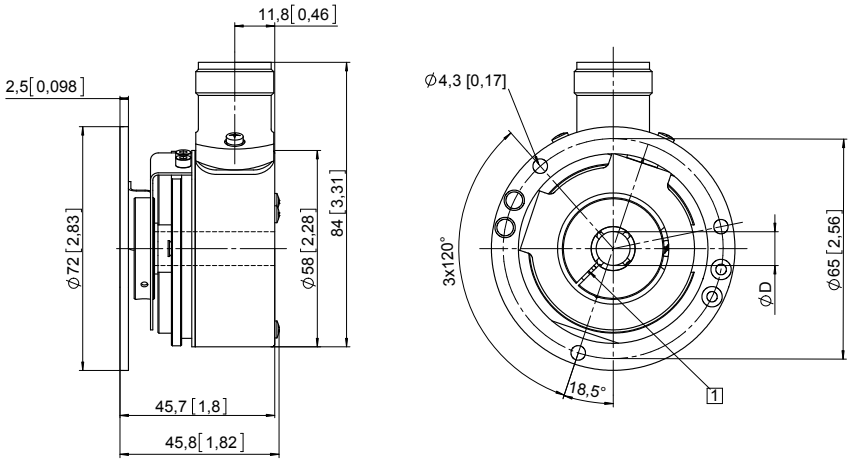


Flange with stator coupling, ø 65 [2.56] Flange type 3 and 4

- 1 Recommended torque for the clamping ring 0.6 Nm

D	Fit
6 [0.24]	H7
8 [0.32]	H7
10 [0.39]	H7
12 [0.47]	H7

Min. insertion depth = 1.5 x D
Insertion depth blind hollow shaft with flange 4:
max. 30 mm [1.18"]



Incremental encoders

**Standard
high temperature, optical**

5803 / 5823 (shaft / hollow shaft)

Push-pull / RS422



The incremental encoders of the high temperature series 5803 / 5823 can be used at up to max. 110 °C.

The high heat resistance – at the same time as high speed – make these encoders the ideal solution for all applications in a high temperature environment.



Powerful

- Can be used at temperatures of up to max. 110 °C.
- High resolution up to 5000 pulses per revolution.
- Maximum speed of 12000 revolutions per minute.

Flexible

- Various connection types for different application purposes.
- Shaft or hollow shaft version.
- With push-pull or RS422 interface.

**Order code
Shaft version**

8.5803 . XXXX . XXXX
Type a b c d e

a Flange

- 1 = clamping flange $\varnothing$ 58 mm [2.28"]
- 2 = synchro flange $\varnothing$ 58 mm [2.28"]
- P = synchro flange $\varnothing$ 63.5 mm [2.5"]
- M = square flange $\square$ 63.5 mm [2.5"]

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

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

c Output circuit / supply voltage

- 4 = RS422 (with inverted signal) / 5 V DC
- 5 = RS422 (with inverted signal) / 10 ... 30 V DC
- 6 = push-pull (with inverted signal) / 10 ... 30 V DC
- 7 = push-pull (without inverted signal) / 10 ... 30 V DC

d Type of connection

- 1 = axial cable, 1 m [3.28'] TPE
- A = axial cable, special length TPE *)
- 2 = radial cable, 1 m [3.28'] TPE
- B = radial cable, special length TPE *)
- 3 = axial M23 connector, 12-pin
- 5 = radial M23 connector, 12-pin
- W = radial MIL connector, 7-pin ²⁾
- Y = radial MIL connector, 10-pin

*) 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.: 8.5803.114A.0100.0030 (for cable length 3 m)

e Pulse rate

- 25, 50, 60, 100, 125, 200, 250,
256, 300, 360, 500, 512, 600,
720, 800, 1000, 1024, 1200,
1250, 1500, 2000, 2048, 2500,
3000, 3600, 4000, 4096, 5000
(e.g. 100 pulses => 0100)

Optional on request
- other pulse rates

1) Only in conjunction with flange M or P.

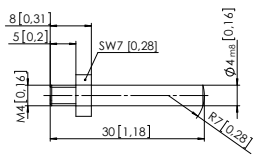
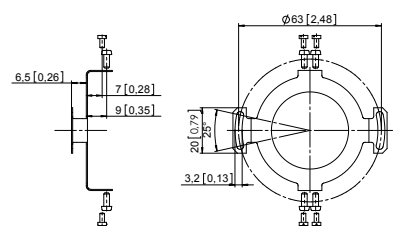
2) Only with output circuit 7.

Incremental encoders

Standard high temperature, optical	5803 / 5823 (shaft / hollow shaft)	Push-pull / RS422
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Order code Hollow shaft	8.5823 Type	.XXXXX.XXXX a b c d e
a Flange 1 = with hollow shaft and spring element, short 2 = with blind hollow shaft and spring element, short 3 = with hollow shaft and stator coupling, ø 65 mm [2.56"] 4 = with blind hollow shaft and stator coupling, ø 65 mm [2.56"] b Hollow shaft (insertion depth blind hollow shaft with flange 2 and 4 max. 30 mm [1.18"]) 1 = ø 6 mm [0.24"], IP40 2 = ø 6 mm [0.24"], IP66 3 = ø 8 mm [0.32"], IP40 4 = ø 8 mm [0.32"], IP66 5 = ø 10 mm [0.39"], IP40 6 = ø 10 mm [0.39"], IP66 7 = ø 12 mm [0.47"], IP40 8 = ø 12 mm [0.47"], IP66 c Output circuit / supply voltage 1 = RS422 (with inverted signal) / 5 V DC 4 = RS422 (with inverted signal) / 10 ... 30 V DC 3 = push-pull (with inverted signal) / 10 ... 30 V DC 2 = push-pull (without inverted signal) / 10 ... 30 V DC d Type of connection 1 = radial cable, 1 m [3.28'] TPE A = radial cable, special length TPE *) 2 = radial M23 connector, 12-pin e Pulse rate 25, 50, 60, 100, 125, 200, 250, 256, 300, 360, 500, 512, 600, 720, 800, 1000, 1024, 1200, 1250, 1500, 2000, 2048, 2500, 3000, 3600, 4000, 4096, 5000 (e.g. 100 pulses => 0100) <i>Optional on request</i> - other pulse rates *) Available special lengths (connection types A): 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.: 8.5823.114A.0100.0030 (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		Order no.
Torque pin, ø 4 mm for flange with spring element (flange type 1 + 2)	with fixing thread 	8.0010.4700.0000
	Stator coupling, ø 63 mm [2.48"] 	8.0010.4D00.0000

Cables and connectors		Order no.
Preassembled cables	M23 female connector with coupling nut, 12-pin, cw single ended 2 m [6.56'] PVC cable	8.0000.6E01.0002
Connectors	M23 female connector with coupling nut, 12-pin, cw	8.0000.5012.0000

Incremental encoders

Standard high temperature, optical	5803 / 5823 (shaft / hollow shaft)	Push-pull / RS422
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Technical data

Mechanical characteristics

Maximum speed	shaft IP65	12000 min ⁻¹
	hollow shaft IP40	12000 min ⁻¹
	hollow shaft IP66 ¹⁾	6000 min ⁻¹
Mass moment of inertia	shaft	approx. 1.8 x 10 ⁻⁶ kgm ²
	hollow shaft	approx. 6.0 x 10 ⁻⁶ kgm ²
Starting torque – at 20 °C [68 °F]		
	shaft IP65 / hollow shaft IP40	< 0.01 Nm
	hollow shaft IP66	< 0.05 Nm
Load capacity of shaft	radial	80 N
	axial	40 N
Weight		approx. 0.4 kg [14.11 oz]
Protection acc. to EN 60529		
	shaft	IP65
	hollow shaft without seal	IP40
	hollow shaft with seal	IP66
Working temperature range		
	shaft IP65 / hollow shaft IP40	-20 °C ... +110 °C [-4 °F ... +230 °F]
	hollow shaft IP66	-20 °C ... +90 °C [-4 °F ... +194 °F]
Material	shaft	stainless steel H7
Shock resistance acc. to EN 60068-2-27		1000 m/s ² , 6 ms
Vibration resistance acc. to EN 60068-2-6		100 m/s ² , 10 ... 2000 Hz

Electrical characteristics

Output circuit	RS422 (TTL compatible)	Push-pull
Supply voltage	5 V DC (±5 %) or 10 ... 30 V DC	10 ... 30 V DC
Power consumption (no load)		
without inverted signal	–	typ. 55 mA / max. 125 mA
with inverted signal	typ. 40 mA / max. 100 mA	typ. 80 mA / max. 150 mA
Permissible load / channel	max. +/- 20 mA	max. +/- 30 mA
Pulse frequency	max. 300 kHz	max. 300 kHz
Signal level	HIGH	min. 2.5 V
	LOW	max. 0.5 V
Rising edge time t_r	max. 200 ns	max. 1 µs
Falling edge time t_f	max. 200 ns	max. 1 µs
Short circuit proof outputs ²⁾	yes ³⁾	yes
Reverse polarity protection of the supply voltage	no; 10 ... 30 V DC: yes	yes

Approvals

UL compliant in accordance with File no. E224618

CE compliant in accordance with

EMC Directive 2014/30/EU
RoHS Directive 2011/65/EU

1) For continuous operation max. 3000 min⁻¹, ventilated.

2) If supply voltage correctly applied.

3) Only one channel allowed to be shorted-out:
if +V = 5 V DC, short-circuit to channel, 0 V, or +V is permitted.
if +V = 10 ... 30 V DC, short-circuit to channel or 0 V is permitted.

Incremental encoders

Standard high temperature, optical	5803 / 5823 (shaft / hollow shaft)	Push-pull / RS422
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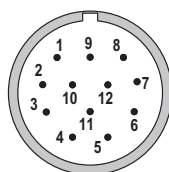
Terminal assignment

Output circuit	Type of connection	Cable (isolate unused cores individually before initial start-up)												
1, 2, 3, 4, 5, 6, 7	5803: 1, 2, A, B	Signal:	0 V	+V	0Vsens ²⁾	+Vsens ²⁾	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	$\perp$	
	5823: 1, A	Core color:	WH 0.5 mm ²	BN 0.5 mm ²	WH	BN	GN	YE	GY	PK	BU	RD	shield	
Output circuit	Type of connection	M23 connector, 12-pin												
1, 2, 3, 4, 5, 6, 7	5803: 3, 5	Signal:	0 V	+V	0Vsens ²⁾	+Vsens ²⁾	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	$\perp$	
	5823: 2	Pin:	10	12	11	2	5	6	8	1	3	4	PH ¹⁾	
Output circuit	Type of connection	MIL connector, 7-pin												
7	5803: W	Signal:	0 V	+V	0Vsens ²⁾	+Vsens ²⁾	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	$\perp$	
	5823: –	Pin:	F	D	–	E	A	–	B	–	C	–	G	
Output circuit	Type of connection	MIL connector, 10-pin												
1, 2, 3, 4, 5, 6, 7	5803: Y	Signal:	0 V	+V	0Vsens ²⁾	+Vsens ²⁾	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	$\perp$	
	5823: –	Pin:	F	D	–	E	A	G	B	H	C	I	J	

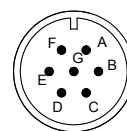
Using RS422 outputs and long cable distances, a wave impedance has to be applied at each cable end.

+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.
 A, $\bar{A}$: Incremental output channel A
 B, $\bar{B}$: Incremental output channel B
 0, $\bar{0}$: Reference signal
 PH $\perp$: Plug connector housing (shield)

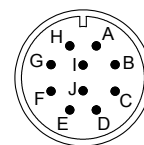
Top view of mating side, male contact base



M23 connector, 12-pin



MIL connector, 7-pin



MIL connector, 10-pin

1) PH = shield is attached to connector housing.

2) The sensor cables are connected to the supply voltage internally. If long feeder cables are involved they can be used to adjust or control the voltage at the encoder.

Incremental encoders

Standard high temperature, optical	5803 / 5823 (shaft / hollow shaft)	Push-pull / RS422
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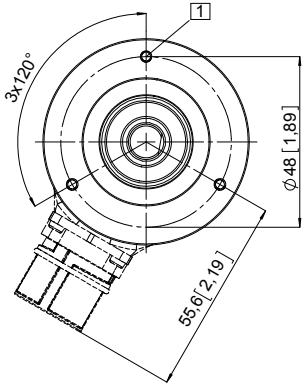
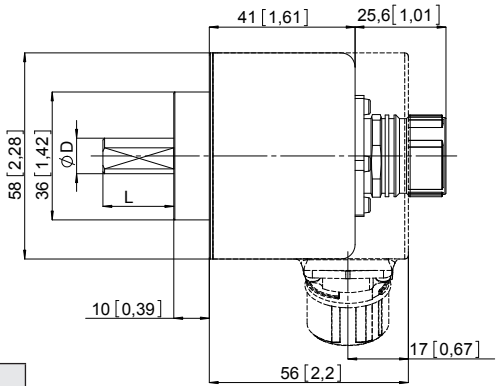
Dimensions shaft version

Dimensions in mm [inch]

Clamping flange, ø 58 [2.28] Flange type 1

1 3 x M3, 5 [0.2] deep

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

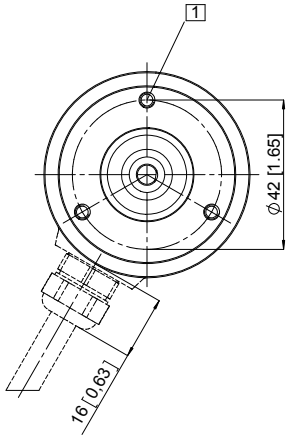
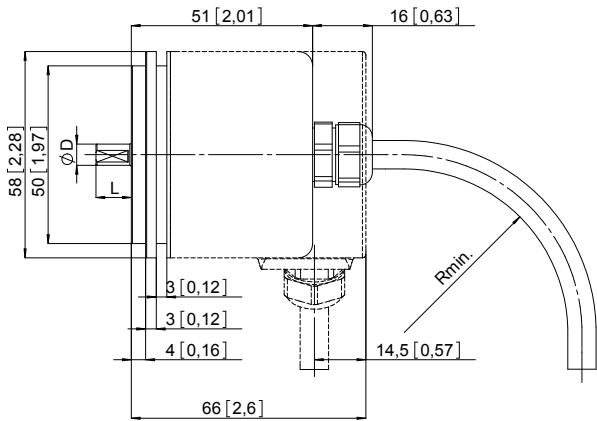


Synchro flange, ø 58 [2.28] Flange type 2

1 3 x M4, 5 [0.2] deep

R_{min}:
- securely installed: 55 [2.17]
- flexibly installed: 70 [2.76]

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



Incremental encoders

Standard
high temperature, optical

5803 / 5823 (shaft / hollow shaft)

Push-pull / RS422

Dimensions hollow shaft version

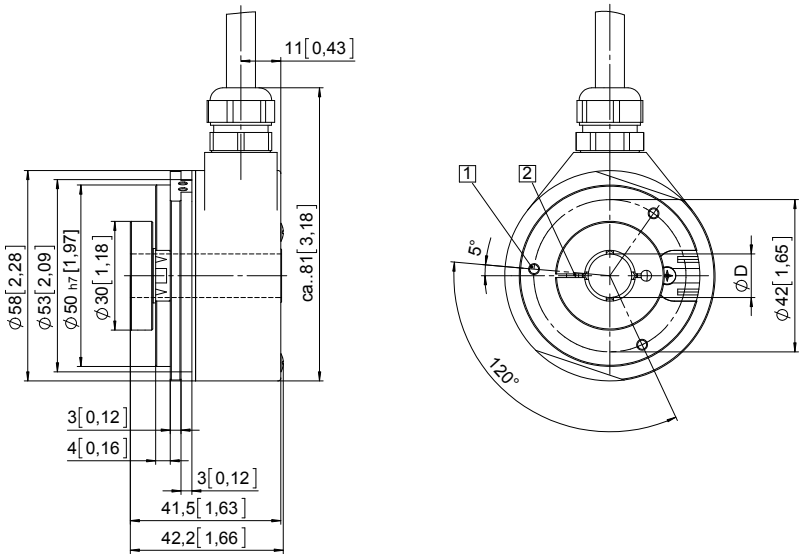
Dimensions in mm [inch]

Flange with spring element, short Flange type 1 and 2

- 1 3 x M3, 5 [0.2] deep
- 2 Recommended torque for the clamping ring 0.6 Nm

D	Fit
6 [0.24]	H7
8 [0.32]	H7
10 [0.39]	H7
12 [0.47]	H7

Insertion depth blind hollow shaft with flange 2:
max. 30 mm [1.18"]

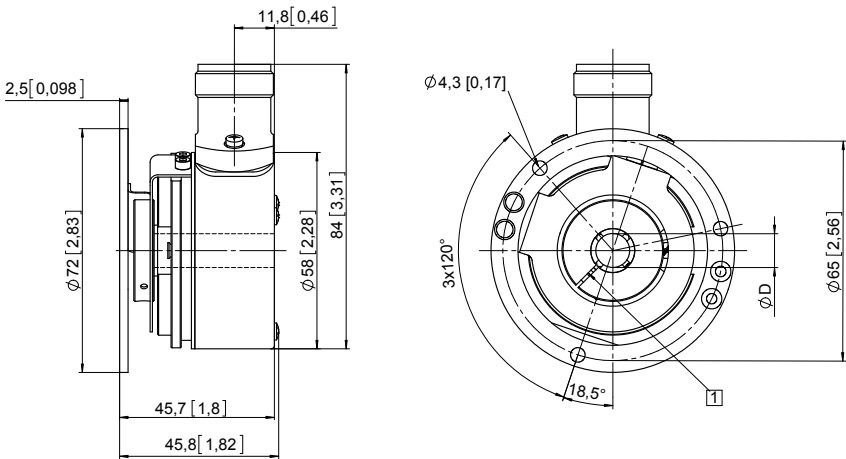


Flange with stator coupling, Ø 65 [2.56] Flange type 3 and 4

- 1 Recommended torque for the clamping ring 0.6 Nm

D	Fit
6 [0.24]	H7
8 [0.32]	H7
10 [0.39]	H7
12 [0.47]	H7

Min. insertion depth = 1.5 x D
Insertion depth blind hollow shaft with flange 4:
max. 30 mm [1.18"]



Incremental encoders

**Standard
stainless steel, optical**

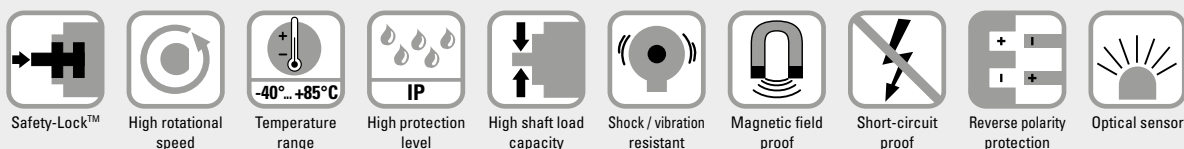
Sendix 5006 / 5026 (shaft / hollow shaft)

Push-pull / RS422



The incremental Sendix encoders 5006 / 5026 in stainless steel offers optimum material resistance and thus virtually unlimited durability.

The high-grade seals, the IP66/IP67 level of protection as well as the wide temperature range additionally ensure impermeability and ruggedness.



Durable and sealed

- Protection rating IP66/IP67.
- Rugged stainless steel housing.
- Wide temperature range -40 °C ... +85 °C.
- Sturdy bearing construction in Safety Lock™ Design for resistance against vibration and installation errors.

Flexible in use

- Compatible with all common US and european standards.
- Supply voltage 5 ... 30 V DC, various interface options, max. 5000 pulses per revolution.
- Compact dimensions: outer diameter 50 mm, installation depth max. 47 mm.

Order code

Shaft version

8.5006

Type

. XXXX 4 . XXXX

a b c d e

a Flange

- 7 = clamping flange ø 58 mm [2.28"]
- A = synchro flange ø 58 mm [2.28"]
- C = square flange □ 63.5 mm [2.5"]

b Shaft (ø x L), with flat

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

c Output circuit / supply voltage

- 2 = push-pull (7272 compatible with inverted signal) / 5 ... 30 V DC
- 5 = push-pull (with inverted signal) / 10 ... 30 V DC
- 4 = RS422 (with inverted signal) / 5 V DC

d Type of connection

- 4 = radial M12 connector, 8-pin

e Pulse rate

- 1, 5, 10, 12, 36, 100, 200, 250, 256, 360, 400, 500, 512, 600, 800, 1000, 1024, 1200, 2000, 2048, 2500, 3600, 4096, 5000 (e.g. 100 pulses => 0100)

Optional on request

- other pulse rates
- Ex 2/22
- seawater resistant (stainless steel V4A)

Stainless steel V4A as standard types (deliverable as from 1 unit)

8.5006.73X4.XXXX-V4A

V4A

1.4404

Order code

Hollow shaft

8.5026

Type

. XXXX 2 . XXXX

a b c d e

a Flange

- 1 = with spring element, long
- C = with stator coupling, ø 63 mm

b Through hollow shaft

- 2 = ø 1/4"
- 4 = ø 3/8"
- 3 = ø 10 mm [0.39"]
- 5 = ø 12 mm [0.47"]
- 6 = ø 1/2"
- 8 = ø 15 mm [0.59"]

c Output circuit / supply voltage

- 2 = push-pull (7272 compatible, with inverted signal) / 5 ... 30 V DC
- 5 = push-pull (with inverted signal) / 10 ... 30 V DC
- 4 = RS422 (with inverted signal) / 5 V DC

d Type of connection

- 2 = radial M12 connector, 8-pin

e Pulse rate

- 1, 5, 10, 12, 36, 100, 200, 250, 256, 360, 400, 500, 512, 600, 800, 1000, 1024, 1200, 2000, 2048, 2500, 3600, 4096, 5000 (e.g. 100 pulses => 0100)

Optional on request

- other pulse rates
- Ex 2/22
- seawater resistant (stainless steel V4A)

Stainless steel V4A as standard types (deliverable as from 1 unit)

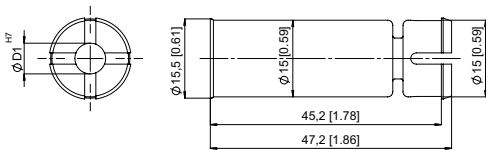
8.5026.18X2.XXXX-V4A

V4A

1.4404

Incremental encoders

Standard stainless steel, optical	Sendix 5006 / 5026 (shaft / hollow shaft)	Push-pull / RS422
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Mounting accessory for hollow shaft encoders	Dimensions in mm [inch]	Order no.
Isolation / adapter inserts for hollow shaft encoders 	Thermal and electrical isolation of the encoders (Temperature range -40 °C ... +115 °C [-40 °F ... +239 °F]) Isolation inserts prevent currents from passing through the encoder bearings. These currents can occur when using inverter controlled three-phase or AC vector motors and considerably shorten the service life of the encoder bearings. In addition the encoder is thermally isolated as the plastic does not transfer the heat to the encoder.	D1 Isolation insert
		6 mm [0.24"] 8.0010.4021.0000
		8 mm [0.32"] 8.0010.4020.0000
		10 mm [0.39"] 8.0010.4023.0000
		12 mm [0.47"] 8.0010.4025.0000¹⁾
		1/4" 8.0010.4022.0000
		3/8" 8.0010.4024.0000
		1/2" 8.0010.4026.0000
		
Tip: By using these adapter inserts you can achieve six different hollow shaft diameters, all on the basis of the encoder 8.5026.X8X2.XXXX.		

Cables and connectors	Order no.
Connectors M12 female connector with coupling nut, 8-pin, A-coded, straight, stainless steel	8.0000.5136.0000.V4A

Technical data

Electrical characteristics				
Output circuit	RS422 (TTL compatible))	Push-pull	Push-pull (7272 compatible)	
Supply voltage	5 V DC (±5 %)	10 ... 30 V DC	5 ... 30 V DC	
Current consumption with inverted signal (no load)	typ. 40 mA max. 90 mA	typ. 50 mA max. 100 mA	typ. 50 mA max. 100 mA	
Permissible load / channel	max. +/- 20 mA	max. +/- 20 mA	max. +/- 20 mA	
Pulse frequency	max. 300 kHz	max. 300 kHz	max. 300 kHz	
Signal level	HIGH min. 2.5 V LOW max. 0.5 V	min +V - 1.0 V max. 0.5 V	min. +V - 2.0 V max. 0.5 V	
Rising edge time t_r	max. 200 ns	max. 1 µs	max. 1 µs	
Falling edge time t_f	max. 200 ns	max. 1 µs	max. 1 µs	
Short circuit proof outputs ²⁾	yes ³⁾	yes	yes	
Reverse polarity protection of the supply voltage	no	yes	no	

Mechanical characteristics	
Maximum speed ⁴⁾	6000 min ⁻¹
Mass moment of inertia	approx. 1.8 x 10 ⁻⁶ kgm ²
Starting torque – at 20 °C [68 °F]	< 0.05 Nm
Weight	approx. 0.4 kg [14.11 oz]
Load capacity of shaft	radial 80 N axial 40 N
Protection acc. to EN 60529	IP66 / IP67
Working temperature	-40 °C ... +85 °C [-40 °F ... +185 °F]
Material	housing, flange, shaft stainless steel, 1.4305 (V2A) connector stainless steel
Shock resistance acc. to EN 60068-2-27	2500 m/s ² , 6 ms
Vibration resistance acc. to EN 60068-2-6	100 m/s ² , 10 ... 2000 Hz

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)

- 1) Stock types.
 2) If supply voltage correctly applied.
 3) Only one channel allowed to be shorted-out:
 at +V = 5 V DC, short-circuit to channel, 0 V, or +V is permitted.
 at +V = 5 ... 30 V DC, short-circuit to channel or 0 V is permitted.
 4) For continuous operation max. 3000 min⁻¹.

Incremental encoders

Standard stainless steel, optical	Sendix 5006 / 5026 (shaft / hollow shaft)	Push-pull / RS422
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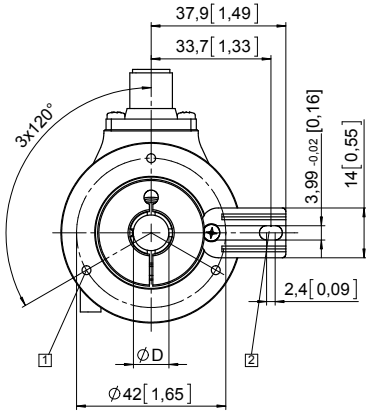
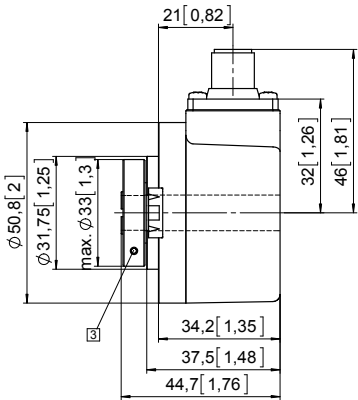
Dimensions hollow shaft version

Dimensions in mm [inch]

Flange with spring element, long Flange type 1

- 1 3 x M3, 6 [0.24] deep
- 2 Slot spring element, recommendation: torque pin DIN 7, $\varnothing$ 4 [0.16]
- 3 Recommended torque for the clamping ring 0.6 Nm

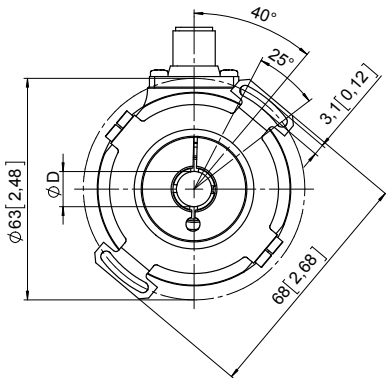
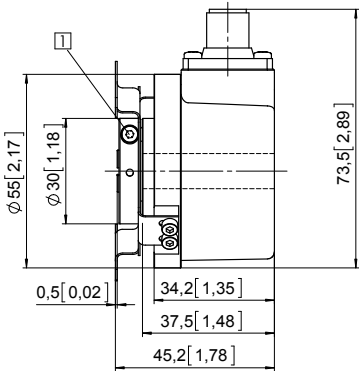
D	Fit
10 [0.39]	H7
12 [0.47]	H7
15 [0.99]	H7
1/4"	H7
3/8"	H7
1/2"	H7



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

- 1 Recommended torque for the clamping ring 0.6 Nm

D	Fit
10 [0.39]	H7
12 [0.47]	H7
15 [0.99]	H7
1/4"	H7
3/8"	H7
1/2"	H7



Incremental encoders

Standard optical

Sendix 5000 / 5020 (shaft / hollow shaft)

Push-pull / RS422 / Open collector



Due to their sturdy bearing construction in Safety-Lock™ Design, the Sendix 5000 and 5020 offer high resistance against vibration and installation errors.

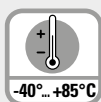
The rugged housing, high protection level of up to IP67, as well as the wide temperature range of -40 °C up to +85 °C, make this product range the perfect encoder for all applications.



Safety-Lock™



High rotational speed



Temperature range



High protection level



High shaft load capacity



Shock / vibration resistant



Magnetic field proof



Short-circuit proof



Reverse polarity protection



Optical sensor

Robust performance

- Increased resistance against shock, vibrations and tolerance of installation errors, elimination of machine downtime and repairs thanks to sturdy bearing construction in "Safety-Lock™ Design".
- Ensures highest safety against field breakdowns and is thus suitable also for outside use thanks to its resistant die-cast housing and protection up to IP67.
- Undetachable clamping ring on hollow shaft encoders.
- Wide temperature range, -40 °C ... +85 °C.

Many variants

- Suitable connection variant for every specific case: cable connection with different standard lengths, M12 (5- or 8-pin), M23 (12-pin), MIL (7- or 10-pin) and Sub-D connector. In addition: Variants with connector fitted in the cable – for error-free electrical connection to your control.
- Reliable mounting in a wide variety of installation situations: comprehensive and proven fixing possibilities.
- Compatible with all US and European standards.
- Wide range of standard pulse ranges up to max. 5000 pulses per revolution.

Technology in detail

Robust Safety-Lock™ bearing structure



Cables with fitted connector



Undetachable clamping ring

Slotted clamping ring + slotted shaft



Tangential cable outlet



Incremental encoders

Standard optical	Sendix 5000 / 5020 (shaft / hollow shaft)	Push-pull / RS422 / Open collector
Order code Shaft version	8.5000 Type	XXXX XXXX
If for each parameter of an encoder the <u>underlined preferred option</u> is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days. An additional requirement is the combination of flange "7" or "8" with shaft "3" or the combination of flange "A" or "B" with shaft "1". e. g.: 8.5000.7344.1024 or 8.5000.B144.1024		
a Flange 5 = synchro flange, IP66/IP67 ø 50.8 mm [2"] 6 = synchro flange, IP65 ø 50.8 mm [2"] <u>7 = clamping flange, IP66/IP67 ø 58 mm [2.28"]</u> <u>8 = clamping flange, IP65 ø 58 mm [2.28"]</u> <u>A = synchro flange, IP66/IP67 ø 58 mm [2.28"]</u> <u>B = synchro flange, IP65 ø 58 mm [2.28"]</u> C = square flange, IP66/IP67 □ 63.5 mm [2.5"] D = square flange, IP65 □ 63.5 mm [2.5"] G = Euro flange, IP66/IP67 ø 115 mm [4.53"]²⁾ 1 = servo flange, IP66/IP67 ø 50.8 mm [2"]³⁾ 2 = servo flange, IP65 ø 50.8 mm [2"]³⁾ 3 = square flange, IP66/IP67 □ 52.3 mm [2.06"]³⁾ 4 = square flange, IP65 □ 52.3 mm [2.06"]³⁾ E = servo flange, IP66/IP67 ø 63.5 mm [2.5"]³⁾ F = servo flange, IP65 ø 63.5 mm [2.5"]³⁾ b Shaft (ø x L), with flat <u>1 = ø 6 x 10 mm [0.24 x 0.39"]</u> 2 = ø 1/4 x 5/8" (6.35 x 15.875 mm) 6 = ø 8 x 15 mm [0.32 x 0.59"] <u>3 = ø 10 x 20 mm [0.39 x 0.79"]</u> 4 = ø 3/8 x 5/8" (9.5 x 15.875 mm) B = ø 11 x 33 mm [0.43 x 1.30"], with feather key shaft slot⁴⁾ 5 = ø 12 x 20 mm [0.47 x 0.79"] 7 = ø 1/4 x 7/8"³⁾ 8 = ø 3/8 x 7/8"³⁾ c Output circuit (with inverted signal) / supply voltage <u>4 = RS422 / 5 V DC</u> 1 = RS422 / 5 ... 30 V DC 2 = push-pull (7272 compatible) / 5 ... 30 V DC <u>5 = push-pull / 10 ... 30 V DC</u> 3 = open collector / 5 ... 30 V DC³⁾ 8 = push-pull (7272 compatible), without capacitor / 5 ... 30 V DC¹⁾³⁾⁵⁾ d Type of connection – cable 1 = axial cable, 1 m [3.28"] PVC A = axial cable, special length PVC *) <u>2 = radial cable, 1 m [3.28"] PVC</u> B = radial cable, special length PVC *) <i>Type of connection – connector</i> P = axial M12 connector, 5-pin⁵⁾ R = radial M12 connector, 5-pin⁵⁾ 3 = axial M12 connector, 8-pin <u>4 = radial M12 connector, 8-pin</u> 7 = axial M23 connector, 12-pin <u>8 = radial M23 connector, 12-pin</u> Y = radial MIL connector, 10-pin W = radial MIL connector, 7-pin⁵⁾ 9 = radial MIL connector, 6-pin³⁾⁵⁾ <i>Type of connection – connector with cable</i> L = radial cable with M12 connector, 8-pin, special length PVC *) M = radial cable with M23 connector, 12-pin, special length PVC *) N = radial cable with Sub-D connector, 9-pin, special length PVC *) *) Available special lengths (connection types A, B, L, M, N): 0.3, 0.5, 1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 20 m [0.98, 1.64, 3.28, 6.56, 9.84, 13.12, 16.40, 19.69, 26.25, 32.80, 39.37, 49.21, 65.62'] order code expansion .XXXX = length in dm ex.: 8.5000.814A.1024.0030 (for cable length 3 m) e Pulse rate 1, 2, 4, 5, 10, 12, 14, 20, 25, 28, 30, 32, 36, 50, 60, 64, 80, <u>100</u>, 120, 125, 150, 180, 200, 240, <u>250</u>, <u>256</u>, 300, 342, <u>360</u>, 375, 400, <u>500</u>, 512, 600, 625, 720, 800, 900, <u>1000</u>, <u>1024</u>, <u>1200</u>, 1250, 1500, 1800, 2000, <u>2048</u>, <u>2500</u>, 3000, 3600, 4000, <u>4096</u>, <u>5000</u> (e.g. 100 pulses => 0100) <i>Optional on request</i> - other pulse rates - Ex 2/22 only for variants with IP66/IP67⁷⁾ (not for type of connection L, M, N) - surface protection salt spray <i>Salt spray tested as standard type (deliverable as from 1 unit)</i>  8.5000.73X4.XXXX-C		

2) Only in conjunction with shaft type B.

3) US version.

4) Only in conjunction with flange type G.

5) Without inverted signal.

6) Attention: no CE types!

7) For type of connection cable, the cable material is PUR.

Incremental encoders

Standard optical	Sendix 5000 / 5020 (shaft / hollow shaft)		Push-pull / RS422 / Open collector
Order code Hollow shaft	8.5020 Type	. <u>X</u> <u>X</u> <u>X</u> <u>X</u> . <u>XXXX</u> <u>a</u> <u>b</u> <u>c</u> <u>d</u> <u>e</u>	If for each parameter of an encoder the <u>underlined preferred option</u> is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days. 
a Flange 1 = with spring element, long, IP66/IP67 2 = with spring element, long, IP65 3 = with torque stop, long, IP66/IP67 <u>4 = with torque stop, long, IP65</u> 7 = with stator coupling, IP66/IP67 $\varnothing$ 65 mm [2.56"] 8 = with stator coupling, IP65 $\varnothing$ 65 mm [2.56"] C = with stator coupling, IP66/IP67 $\varnothing$ 63 mm [2.48"] <u>D = with stator coupling, IP65 $\varnothing$ 63 mm [2.48"]</u> 5 = with stator coupling, IP66/IP67 $\varnothing$ 57.2 mm [2.25"] ¹⁾ 6 = with stator coupling, IP65 $\varnothing$ 57.2 mm [2.25"] ¹⁾ b Through hollow shaft 1 = $\varnothing$ 6 mm [0.24"] 2 = $\varnothing$ 1/4" <u>9 = $\varnothing$ 8 mm [0.32"]</u> 4 = $\varnothing$ 3/8" <u>3 = $\varnothing$ 10 mm [0.39"]</u> <u>5 = $\varnothing$ 12 mm [0.47"]</u> 6 = $\varnothing$ 1/2" A = $\varnothing$ 14 mm [0.55"] <u>8 = $\varnothing$ 15 mm [0.59"]</u> 7 = $\varnothing$ 5/8" c Output circuit (with inverted signal) / supply voltage <u>4 = RS422 / 5 V DC</u> 1 = RS422 / 5 ... 30 V DC 2 = push-pull (7272 compatible) / 5 ... 30 V DC <u>5 = push-pull / 10 ... 30 V DC</u> 3 = open collector / 5 ... 30 V DC ¹⁾ 8 = push-pull (7272 compatible), without capacitor / 5 ... 30 V DC ^{1) 2)}			
d Type of connection – cable <u>1 = radial cable, 1 m [3.28'] PVC</u> A = radial cable, special length PVC *) <u>E = tangential cable, 1 m [3.28'] PVC</u> F = tangential cable, special length PVC *) Type of connection – connector R = radial M12 connector, 5-pin ³⁾ <u>2 = radial M12 connector, 8-pin</u> <u>4 = radial M23 connector, 12-pin</u> 6 = radial MIL connector, 7-pin 7 = radial MIL connector, 10-pin Type of connection – connector with cable H = tangential cable, 0.3 m [0.98'] PVC, incl. M12 connector, 8-pin for central fastening L = tangential cable with M12 connector, 8-pin, special length PVC *) M = tangential cable with M23 connector, 12-pin, special length PVC *) N = tangential cable with Sub-D connector, 9-pin, special length PVC *) *) Available special lengths (connection types A, F, L, M, N): 0.3, 0.5, 1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 20 m [0.98, 1.64, 3.28, 6.56, 9.84, 13.12, 16.40, 19.69, 26.25, 32.80, 39.37, 49.21, 65.62'] order code expansion .XXXX = length in dm ex.: 8.5020.234A.1024.0030 (for cable length 3 m) e Pulse rate 1, 2, 4, 5, 10, 12, 14, 20, 25, 28, 30, 32, 36, 50, 60, 64, 80, <u>100</u>, 120, 125, 150, 180, 200, 240, <u>250</u>, <u>256</u>, 300, 342, <u>360</u>, 375, 400, <u>500</u>, 512, 600, 625, 720, 800, 900, <u>1000</u>, <u>1024</u>, <u>1200</u>, 1250, 1500, 1800, 2000, <u>2048</u>, <u>2500</u>, 3000, 3600, 4000, <u>4096</u>, <u>5000</u> (e.g. 100 pulses => 0100) Optional on request - other pulse rates - Ex 2/22 only for variants with IP66/IP67 ⁴⁾ (not for type of connection E, F, H, L, M, N) - surface protection salt spray Salt spray tested as standard type (deliverable as from 1 unit)  8.5020.18X2.XXXX-C 8.5020.1AX2.XXXX-C			

1) US version.

2) Attention: no CE types!

3) Without inverted signal.

4) For type of connection cable, the cable material is PUR.

Incremental encoders

Standard optical		Sendix 5000 / 5020 (shaft / hollow shaft)		Push-pull / RS422 / Open collector	
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 ¹⁾	
Mounting accessory for hollow shaft encoders Dimensions in mm [inch]				Order no.	
Torque pin, ø 4 mm		with fixing thread		8.0010.4700.0000 ¹⁾	
for flange with spring element (flange type 1 + 2)					
Isolation / adapter inserts for hollow shaft encoders order code 8.5020.X8XX.XXXX 		Thermal and electrical isolation of the encoders (Temperature range -40 °C ... +115 °C [-40 °F ... +239 °F]) Isolation inserts prevent currents from passing through the encoder bearings. These currents can occur when using inverter controlled three-phase or AC vector motors and considerably shorten the service life of the encoder bearings. In addition the encoder is thermally isolated as the plastic does not transfer the heat to the encoder.		D1	
				6 mm	
				8 mm	
				10 mm	
				12 mm	
				1/4"	
				3/8"	
				1/2"	
				Isolation insert	
		45.2 [1.78]		8.0010.4021.0000	
		47.2 [1.86]		8.0010.4020.0000	
				8.0010.4023.0000	
				8.0010.4025.0000 ¹⁾	
				8.0010.4022.0000	
				8.0010.4024.0000	
				8.0010.4026.0000	
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	
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	
		MIL female connector with coupling nut, 10-pin		8.0000.5062.0000	

1) Stock types

Incremental encoders

Standard optical	Sendix 5000 / 5020 (shaft / hollow shaft)	Push-pull / RS422 / Open collector
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Technical data

Mechanical characteristics		
Maximum speed	IP65	12000 min ⁻¹
		6000 min ⁻¹ (continuous)
	IP66/IP67	6000 min ⁻¹ 3000 min ⁻¹ (continuous)
Mass moment of inertia	shaft version	approx. 1.8 x 10 ⁻⁶ kgm ²
	hollow shaft version	approx. 6 x 10 ⁻⁶ kgm ²
Starting torque at 20 °C [68 °F]	IP65	< 0.01 Nm
	IP66/IP67	< 0.05 Nm
Shaft load capacity	radial	100 N
	axial	50 N
Weight		approx. 0.4 kg [14.11 oz]
Protection acc. to EN 60529	without shaft seal	IP65
	with shaft seal	IP66/IP67
Working temperature range		-40 °C ¹⁾ ... +85 °C [-40 °F ¹⁾ ... +185 °F]
Material	shaft	stainless steel
Shock resistance acc. to EN 60068-2-27		3000 m/s ² , 6 ms ²⁾
Vibration resistance acc. to EN 60068-2-6		300 m/s ² , 10 ... 2000 Hz ³⁾

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)

Electrical characteristics							
Output circuit		RS422 (TTL compatible)	RS422 (TTL compatible)	Push-pull	Push-pull (HTL/TTL universal, 7272 compatible)	Push-pull (7272 compatible, without capacitor)	Open collector (7273)
	Order code	1	4	5	2	8	3
Supply voltage		5 ... 30 V DC	5 V DC (±5 %)	10 ... 30 V DC	5 ... 30 V DC	5 ... 30 V DC	5 ... 30 V DC
Power consumption (no load)		typ. 40 mA max. 90 mA	typ. 40 mA max. 90 mA	typ. 50 mA max. 100 mA	typ. 50 mA max. 100 mA	typ. 50 mA max. 100 mA	100 mA
Permissible load / channel		max. +/- 20 mA	max. +/- 20 mA	max. +/- 20 mA	max. +/- 20 mA	max. +/- 20 mA	20 mA sink at 30 V DC
Pulse frequency		max. 300 kHz	max. 300 kHz	max. 300 kHz	max. 300 kHz ⁴⁾	max. 300 kHz	max. 300 kHz
Signal level	HIGH LOW	min. 2.5 V max. 0.5 V	min. 2.5 V max. 0.5 V	min +V - 1.0 V max. 0.5 V	min. +V - 2.0 V max. 0.5 V	min. +V - 2.0 V max. 0.5 V	
Rising edge time t _r		max. 200 ns	max. 200 ns	max. 1 µs	max. 1 µs	max. 1 µs	
Falling edge time t _f		max. 200 ns	max. 200 ns	max. 1 µs	max. 1 µs	max. 1 µs	
Short circuit proof outputs ⁵⁾		yes ⁶⁾	yes ⁶⁾	yes	yes	yes ⁶⁾	yes
Reverse polarity protection of the supply voltage		yes	no	yes	no	no	no

1) With connector: -40 °C [-40 °F], cable fixed: -30 °C [-22 °F], cable moved: -20 °C [-4 °F].

2) For MIL connectors: 2500 m/s²

3) For MIL connectors: 100 m/s²

4) Max. recommended cable length 30 m [98.43'].

5) If supply voltage correctly applied.

6) Only one channel allowed to be shorted-out:
at +V= 5 V DC, short-circuit to channel, 0 V, or +V is permitted.
at +V= 5 ... 30 V DC, short-circuit to channel or 0 V is permitted.

Incremental encoders

Standard optical	Sendix 5000 / 5020 (shaft / hollow shaft)	Push-pull / RS422 / Open collector
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Terminal assignment

Output circuit	Type of connection	Cable (isolate unused cores individually before initial start-up)											
1, 2, 3, 4, 5, 8	5000: 1, 2, A, B	Signal:	0 V	+V	0 Vsens	+Vsens	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	$\perp$
	5020: 1, A, E, F	Core color:	WH	BN	GY PK	RD BU	GN	YE	GY	PK	BU	RD	shield

Output circuit	Type of connection	M12 connector, 5-pin						
1, 2, 3, 4, 5, 8	5000: P, R	Signal:	0 V	+V	A	B	0	$\perp$
	5020: R	Pin:	1	2	3	4	5	PH ¹⁾

Output circuit	Type of connection	M12 connector, 8-pin										
1, 2, 3, 4, 5, 8	5000: 3, 4, L	Signal:	0 V	+V	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	$\perp$	
	5020: 2, H ²⁾ , L	Pin:	1	2	3	4	5	6	7	8	PH ¹⁾	

Output circuit	Type of connection	M23 connector, 12-pin											
1, 2, 3, 4, 5, 8	5000: 7, 8, M	Signal:	0 V	+V	0 Vsens	+Vsens	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	$\perp$
	5020: 4, M	Pin:	10	12	11	2	5	6	8	1	3	4	PH ¹⁾

Output circuit	Type of connection	MIL connector, 10-pin										
1, 2, 3, 4, 5, 8	5000: Y	Signal:	0 V	+V	+Vsens	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	$\perp$
	5020: 7	Pin:	F	D	E	A	G	B	H	C	I	J

Output circuit	Type of connection	MIL connector, 7-pin						
1, 3, 4, 5, 8	5000: W	Signal:	0 V	+V	+Vsens	A	B	0
	5020: 6	Pin:	F	D	E	A	B	C

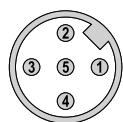
Output circuit	Type of connection	MIL connector, 6-pin					
1, 3, 4, 5, 8	5000: 9	Signal:	0 V	+V	A	B	0
		Pin:	A	B	E	D	C

Output circuit	Type of connection	Sub-D connector, 9-pin									
1, 2, 3, 4, 5, 8	5000: N	Signal:	0 V	+V	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	$\perp$
	5020: N	Pin:	9	5	1	6	2	7	3	8	PH ¹⁾

+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.

A, $\bar{A}$: Incremental output channel A
 B, $\bar{B}$: Incremental output channel B
 0, $\bar{0}$: Reference signal
 PH $\perp$: Plug connector housing (shield)

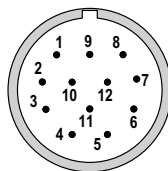
Top view of mating side, male contact base



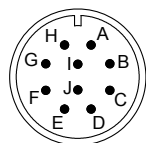
M12 connector, 5-pin



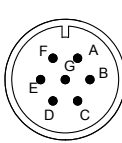
M12 connector, 8-pin



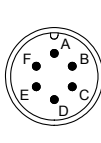
M23 connector, 12-pin



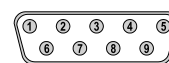
MIL connector, 10-pin



MIL connector, 7-pin



MIL connector, 6-pin



Sub-D connector, 9-pin

1) PH = shield is attached to connector housing.

2) With type of connection H shield is not attached to connector housing.

Incremental encoders

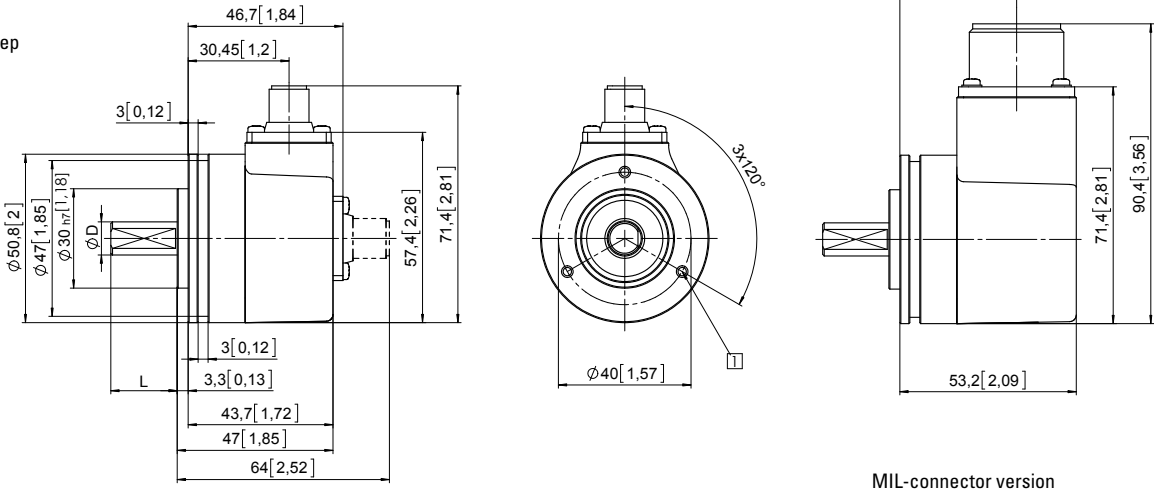
Standard optical	Sendix 5000 / 5020 (shaft / hollow shaft)	Push-pull / RS422 / Open collector
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Dimensions shaft version

Dimensions in mm [inch]

Synchro flange, $\varnothing$ 50.8 [2]
Flange type 5 and 6

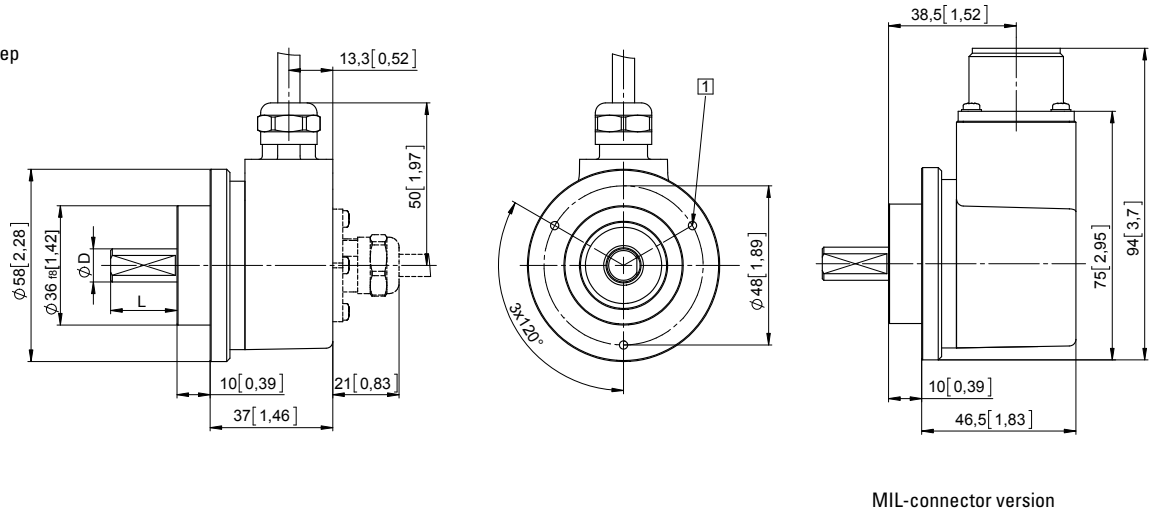
1 3 x M3, 6 [0.24] deep



D	Fit	L
6 [0.24]	h7	10 [0.39]
8 [0.32]	h7	15 [0.59]
10 [0.39]	h7	20 [0.79]
12 [0.47]	h7	20 [0.79]
1/4"	h7	5/8"
3/8"	h7	5/8"
1/4"	h8	7/8"
3/8"	h8	7/8"

Clamping flange, $\varnothing$ 58 [2.28]
Flange type 7 and 8

1 3 x M3, 6 [0.24] deep



D	Fit	L
6 [0.24]	h7	10 [0.39]
8 [0.32]	h7	15 [0.59]
10 [0.39]	h7	20 [0.79]
12 [0.47]	h7	20 [0.79]
1/4"	h7	5/8"
3/8"	h7	5/8"
1/4"	h8	7/8"
3/8"	h8	7/8"

Incremental encoders

Standard optical

Sendix 5000 / 5020 (shaft / hollow shaft)

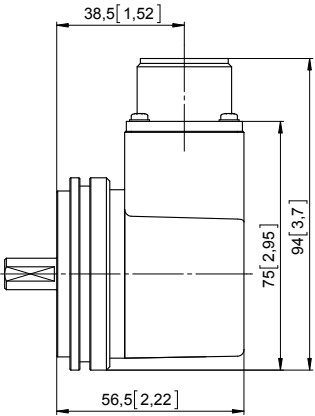
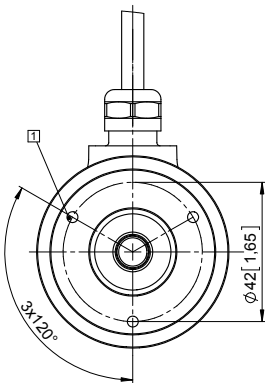
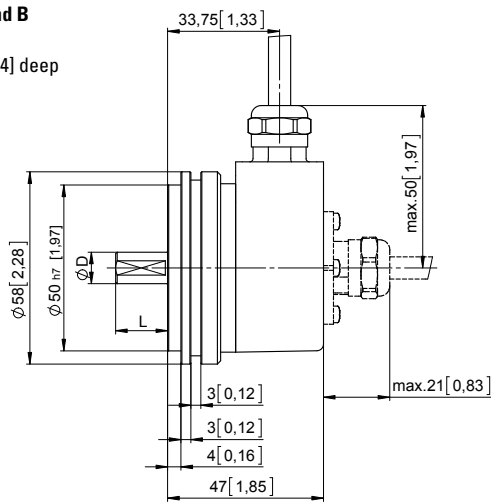
Push-pull / RS422 / Open collector

Dimensions shaft version

Dimensions in mm [inch]

Synchro flange, $\varnothing$ 58 [2.28]
Flange type A and B

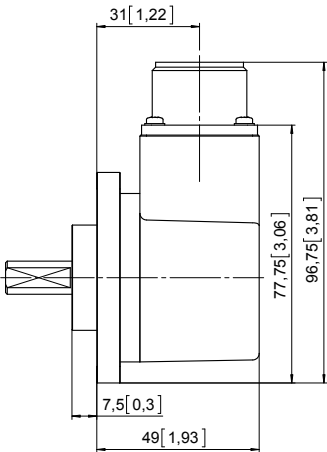
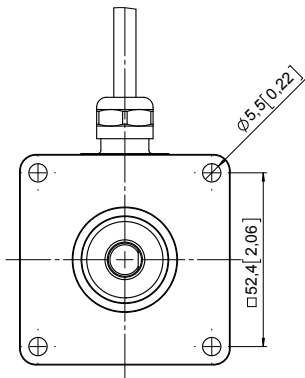
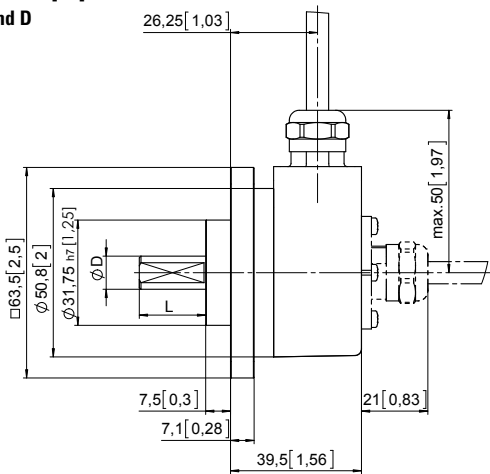
1 3 x M4, 6 [0.24] deep



MIL-connector version

D	Fit	L
6 [0.24]	h7	10 [0.39]
8 [0.32]	h7	15 [0.59]
10 [0.39]	h7	20 [0.79]
12 [0.47]	h7	20 [0.79]
1/4"	h7	5/8"
3/8"	h7	5/8"
1/4"	h8	7/8"
3/8"	h8	7/8"

Square flange, $\square$ 63.5 [2.5]
Flange type C and D



MIL-connector version

D	Fit	L
6 [0.24]	h7	10 [0.39]
8 [0.32]	h7	15 [0.59]
10 [0.39]	h7	20 [0.79]
12 [0.47]	h7	20 [0.79]
1/4"	h7	5/8"
3/8"	h7	5/8"
1/4"	h8	7/8"
3/8"	h8	7/8"

Incremental encoders

Standard optical

Sendix 5000 / 5020 (shaft / hollow shaft)

Push-pull / RS422 / Open collector

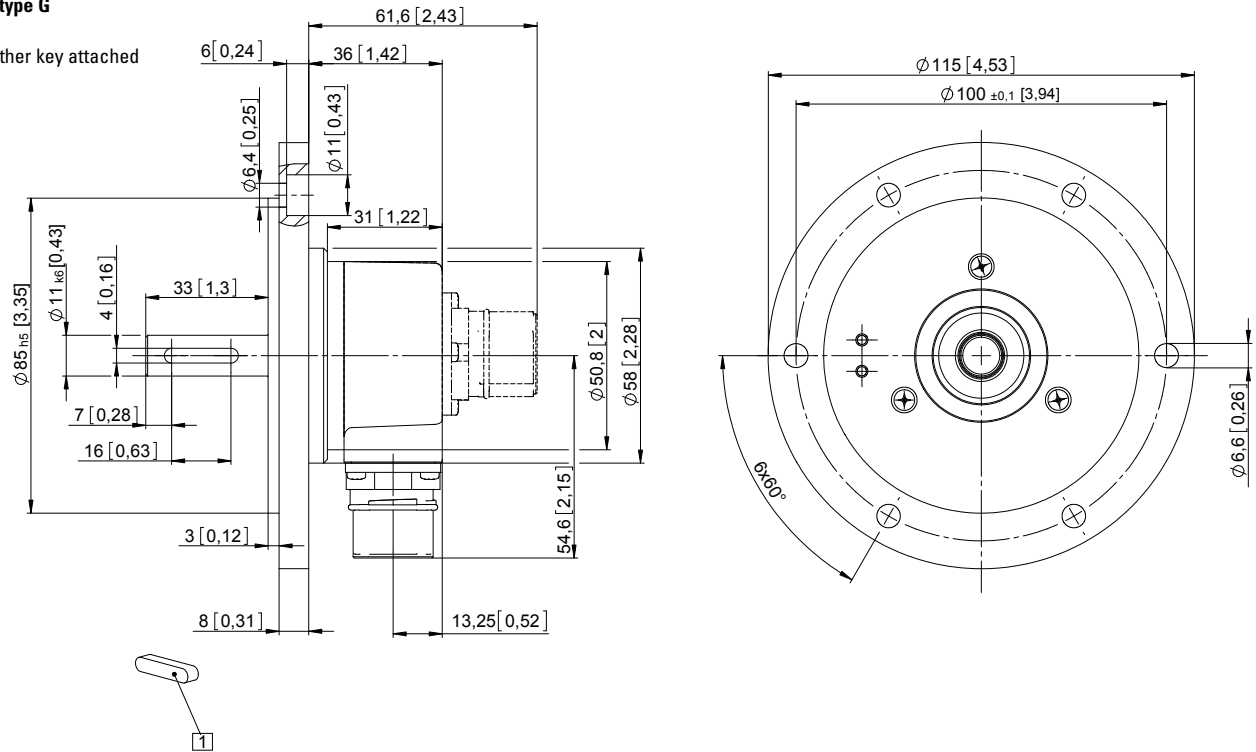
Dimensions shaft version

Dimensions in mm [inch]

Euro flange, ø 115 [4.53]

Flange type G

1 Feather key attached

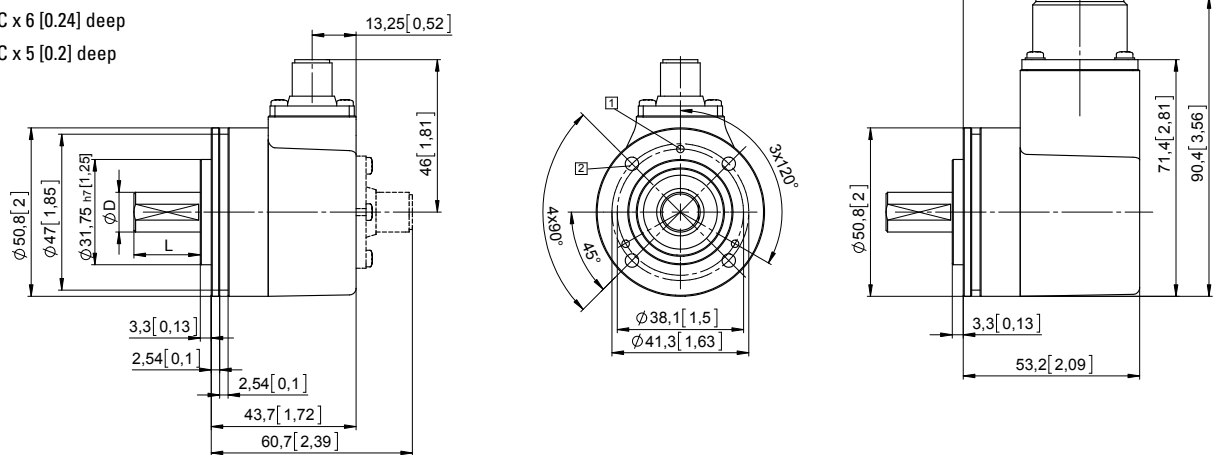


Servo flange, ø 50.8 [2]

Flange type 1 and 2

① 4-40 UNC x 6 [0.24] deep

2 6-32 UNC x 5 [0.2] deep



MIL-connector version

D	Fit	L
6 [0.24]	h7	10 [0.39]
8 [0.32]	h7	15 [0.59]
10 [0.39]	h7	20 [0.79]
12 [0.47]	h7	20 [0.79]
1/4"	h7	5/8"
3/8"	h7	5/8"
1/4"	h8	7/8"
3/8"	h8	7/8"

Incremental encoders

Standard optical	Sendix 5000 / 5020 (shaft / hollow shaft)	Push-pull / RS422 / Open collector
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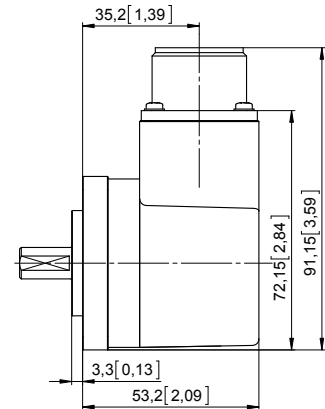
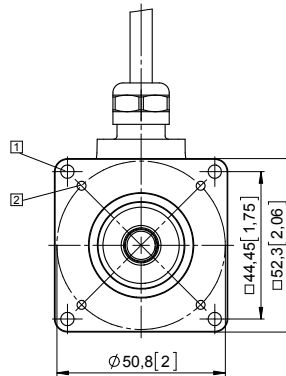
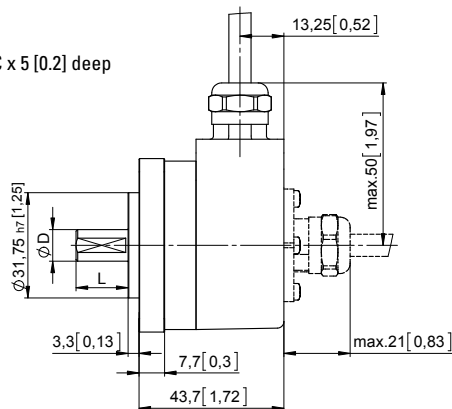
Dimensions shaft version

Dimensions in mm [inch]

Square flange, □ 52.3 [2.06]

Flange type 3 and 4

- 1 ∅ 4 [0.16]
- 2 6-32 UNC x 5 [0.2] deep



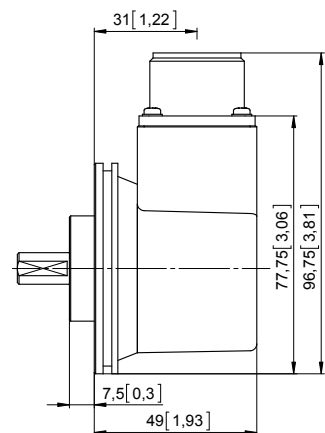
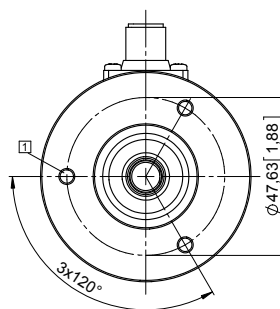
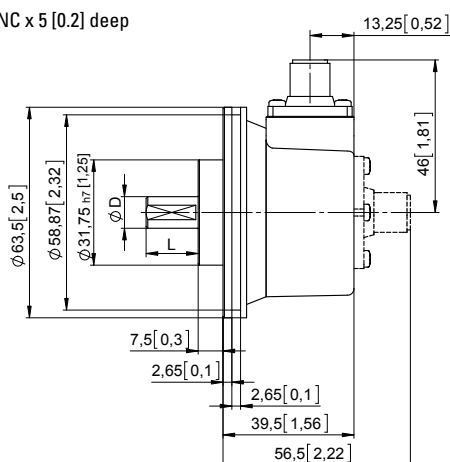
MIL-connector version

D	Fit	L
6 [0.24]	h7	10 [0.39]
8 [0.32]	h7	15 [0.59]
10 [0.39]	h7	20 [0.79]
12 [0.47]	h7	20 [0.79]
1/4"	h7	5/8"
3/8"	h7	5/8"
1/4"	h8	7/8"
3/8"	h8	7/8"

Servo flange, ∅ 63.5 [2.5]

Flange type E and F

- 1 6-32 UNC x 5 [0.2] deep



MIL-connector version

D	Fit	L
6 [0.24]	h7	10 [0.39]
8 [0.32]	h7	15 [0.59]
10 [0.39]	h7	20 [0.79]
12 [0.47]	h7	20 [0.79]
1/4"	h7	5/8"
3/8"	h7	5/8"
1/4"	h8	7/8"
3/8"	h8	7/8"

Incremental encoders

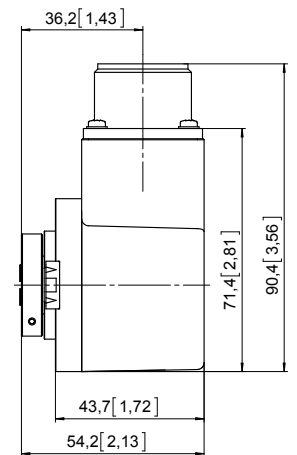
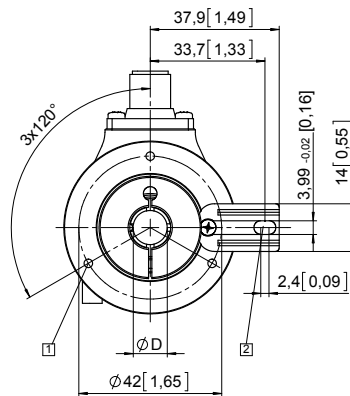
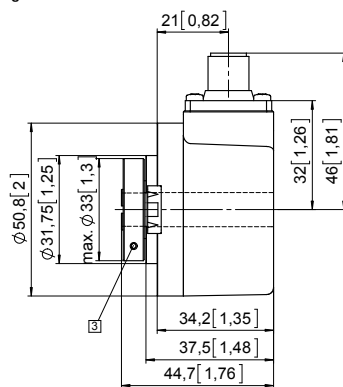
Standard optical	Sendix 5000 / 5020 (shaft / hollow shaft)	Push-pull / RS422 / Open collector
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Dimensions hollow shaft version

Dimensions in mm [inch]

Flange with spring element, long Flange type 1 and 2

- 1 3 x M3, 6 [0.24] deep
- 2 Slot spring element, recommendation: torque pin DIN 7, $\varnothing$ 4 [0.16]
- 3 Recommended torque for the clamping ring 0.6 Nm



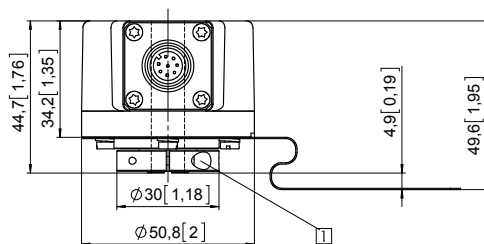
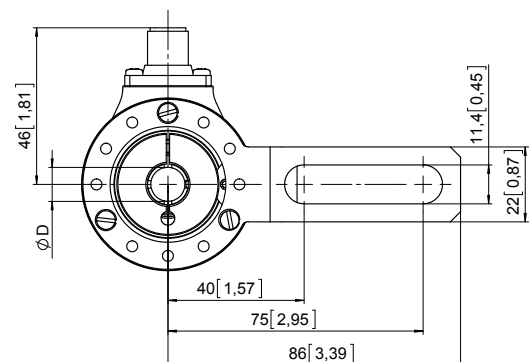
D	Fit
6 [0.24]	H7
8 [0.32]	H7
10 [0.39]	H7
12 [0.47]	H7
14 [0.55]	H7
15 [0.59]	H7
1/4"	H7
3/8"	H7
1/2"	H7
5/8"	H7

Recommended fit for shaft on customer side is g6.

MIL-connector version

Flange with torque stop, long Flange type 3 and 4

- 1 Recommended torque for the clamping ring 0.6 Nm



D	Fit
6 [0.24]	H7
8 [0.32]	H7
10 [0.39]	H7
12 [0.47]	H7
14 [0.55]	H7
15 [0.59]	H7
1/4"	H7
3/8"	H7
1/2"	H7
5/8"	H7

Recommended fit for shaft on customer side is g6.

Incremental encoders

Standard optical

Sendix 5000 / 5020 (shaft / hollow shaft)

Push-pull / RS422 / Open collector

Dimensions hollow shaft version

Dimensions in mm [inch]

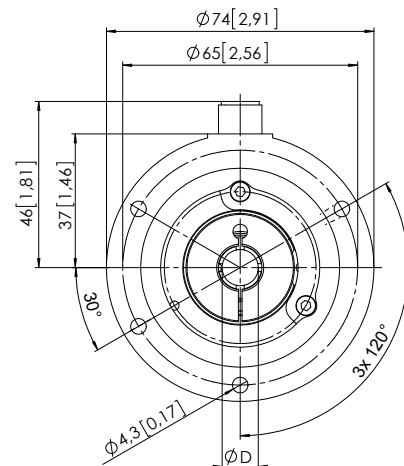
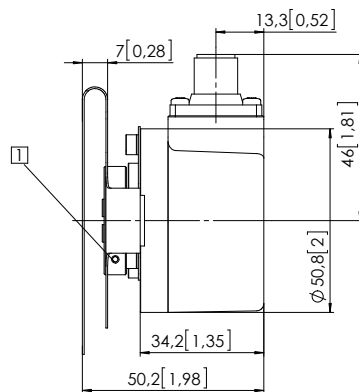
Flange with stator coupling, ø 65 [2.56]

Flange type 7 and 8

- 1 Recommended torque for the clamping ring 0.6 Nm

D	Fit
6 [0.24]	H7
8 [0.32]	H7
10 [0.39]	H7
12 [0.47]	H7
14 [0.55]	H7
15 [0.59]	H7
1/4"	H7
3/8"	H7
1/2"	H7
5/8"	H7

Recommended fit for shaft on customer side is g6.



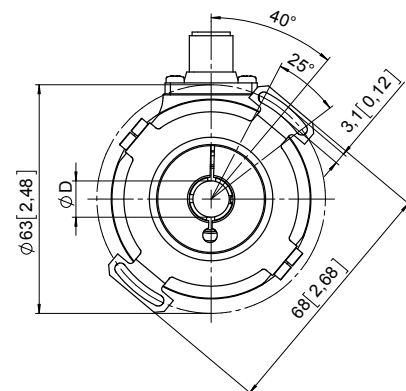
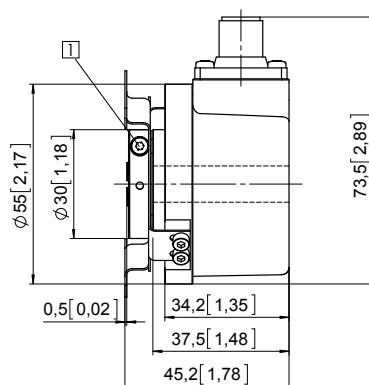
Flange with stator coupling, ø 63 [2.48]

Flange type C and D

- 1 Recommended torque for the clamping ring 0.6 Nm

D	Fit
6 [0.24]	H7
8 [0.32]	H7
10 [0.39]	H7
12 [0.47]	H7
14 [0.55]	H7
15 [0.59]	H7
1/4"	H7
3/8"	H7
1/2"	H7
5/8"	H7

Recommended fit for shaft on customer side is g6.



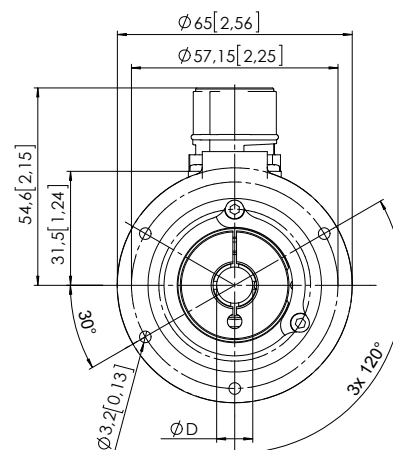
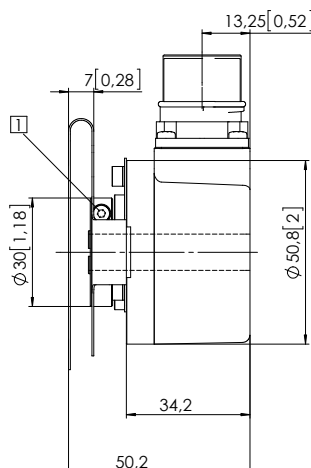
Flange with stator coupling, ø 57.2 [2.25]

Flange type 5 and 6

- 1 Recommended torque for the clamping ring 0.6 Nm

D	Fit
6 [0.24]	H7
8 [0.32]	H7
10 [0.39]	H7
12 [0.47]	H7
14 [0.55]	H7
15 [0.59]	H7
1/4"	H7
3/8"	H7
1/2"	H7
5/8"	H7

Recommended fit for shaft on customer side is g6.



Incremental encoders

Standard optical	Sendix 5000 / 5020 (shaft / hollow shaft)	Push-pull / RS422 / Open collector
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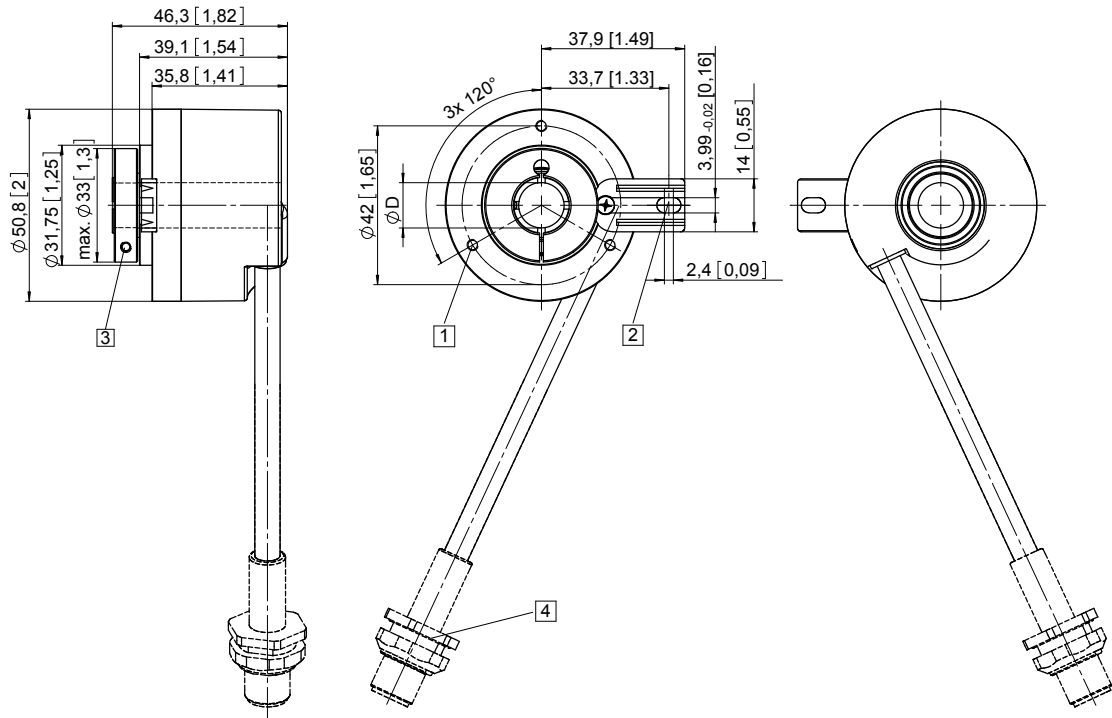
Dimensions hollow shaft version

Dimensions in mm [inch]

Flange with spring element, long and tangential cable outlet

Type of connection E, F and H

- 1 3 x M3, 6 [0.24] deep
- 2 Slot spring element, recommendation: torque pin DIN 7, $\varnothing$ 4 [0.16]
- 3 Recommended torque for the clamping ring 0.6 Nm
- 4 Shield is not applied on connector



D	Fit
6 [0.24]	H7
8 [0.32]	H7
10 [0.39]	H7
12 [0.47]	H7
14 [0.55]	H7
15 [0.59]	H7
1/4"	H7
3/8"	H7
1/2"	H7
5/8"	H7

Recommended fit for shaft on customer side is g6.

Accessories

Connection of motor and encoder

Couplings

Bellows and spring washer couplings



Bellows couplings provide cost-effective connection of the motor and encoder. They are also able to correct any angular errors between the drive and encoder.

Spring washer couplings are used with high speeds.

Order code Couplings

8.0000 . 1 XXX . XX XX
Type a b c

a Type of coupling

- 102 = Bellows-type ø 19 mm [0.75"]
- 202 = Bellows-type ø 15 mm [0.59"]
- 301 = Spring washer type, ø 30 mm [1.18"], one-part
- 401 = Spring washer type, ø 30 mm [1.18"], three part, plug-in
- 502 = Bellows-type ø 25 mm [0.98"]

b Bore diameter d1 (see technical data)

Note:
for the bore diameter
d1 = 1/4" please enter Code A2

c Bore diameter d2 (see technical data)

Example: d1 = 10 mm [0.39"] and d2 = 12 mm [0.47"]
Order no. = 8.0000.1X0X.1012

Stock types

8.0000.1102.1010

Technical data

Type		8.0000.1102.XXXX	8.0000.1202.XXXX	8.0000.1301.XXXX	8.0000.1401.XXXX	8.0000.1502.XXXX
Maximum speed	min ⁻¹	10000	10000	12000	12000	10000
Maximum torque	Ncm	120	40	80	60	200
Maximum displacement	radial mm	± 0.3	± 0.25	± 0.4	± 0.3	± 0.35
	axial mm	± 0.5	± 0.45	± 0.4	± 0.4	± 0.54
	angular °	± 4°	± 4°	± 3°	± 2.5°	± 4°
Torsion spring stiffness	Nm/rad	150	85	150	30	183
Radial spring stiffness	N/mm	10	20	6	40	17.8
Moment of inertia	gcm ²	9.5	2.1	19	35	20
Max. tightening torque	Ncm	150	70	80	80	120
Working temperature		-30°C ... +120°C [-22°F ... +248°F]	-30°C ... +120°C [-22°F ... +248°F]	-30°C ... +120°C [-22°F ... +248°F]	-10°C ... +80°C [+14°F ... +176°F]	-30°C ... +120°C [-22°F ... +248°F]
Weight approx.		16 g [0.56 oz]	6.5 g [0.23 oz]	16 g [0.56 oz]	30 g [1.06 oz]	24 g [0.85 oz]
Material	flange bellows or spring washer/casing	Al, anodized stainless steel	Al, anodized stainless steel	Al, anodized stainless steel	Al, anodized PA 6.6 gf.	Al, anodized stainless steel
Diameter d/d1 from ... to	mm [inch]	3 ... 12 [0.12 ... 0.47]	3 ... 9 [0.12 ... 0.35]	3 ... 8 [0.12 ... 0.32]	4 ... 16 [0.16 ... 0.47]	3 ... 16 [0.12 ... 0.63]
Standard bore diameter	(d1 / d2) mm [inch]	12 / 12 [0.47 ... 0.47]	08 / 06 [0.32 ... 0.24]	06 / 06 [0.24 ... 0.24]	12 / 12 [0.47 ... 0.47]	15 / 12 [0.59 ... 0.47]
		12 / 10 [0.47 ... 0.39]	06 / 06 [0.24 ... 0.24]		12 / 10 [0.47 ... 0.39]	14 / 12 [0.55 ... 0.47]
		10 / 10 [0.39 ... 0.39]	06 / 04 [0.24 ... 0.16]		10 / 10 [0.39 ... 0.39]	14 / 10 [0.55 ... 0.39]
		10 / 08 [0.39 ... 0.32]	04 / 04 [0.16 ... 0.16]		10 / 06 [0.39 ... 0.24]	10 / 10 [0.39 ... 0.39]
		10 / 06 [0.39 ... 0.24]			06 / 06 [0.24 ... 0.24]	06 / 06 [0.24 ... 0.24]
		08 / 08 [0.32 ... 0.32]			1/4" / 10	
		06 / 06 [0.24 ... 0.24]			1/4" / 06	

Description and applications

Manufacturing and installation tolerances as well as the effects of temperature cause alignment errors between shafts in drive engineering which can sometimes lead to extreme overload on the bearings.

This may result in increased wear of the bearings and may lead to premature failure of the encoder. By using couplings, these alignment errors can be compensated, thereby reducing the load on the bearings to a minimum. A distinction should be made between three different kinds of alignment error: radial, angular and axial displacement.

Whilst with torsion-free but flexible shaft couplings, axial shaft displacements produce only static forces in the coupling, radial and angular displacements produce alternating stresses, restoring forces and moments which may have an impact on adjoining components (shaft bearings).

Depending on the type of coupling, particular attention should be paid to radial shaft displacement which should be kept to a minimum.

Accessories

Connection of motor and encoder

Couplings

Bellows and spring washer couplings

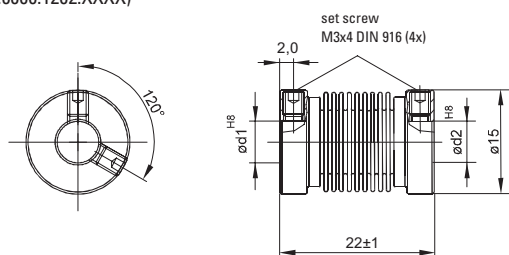
Metal bellows-type couplings (.1102, .1202 und .1502)

Metal bellows-type couplings are recommended as an inexpensive type of coupling. They are also suitable for compensating larger angle displacements.

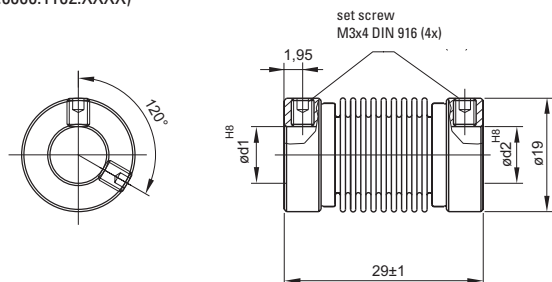
Dimensions

Dimensions in mm

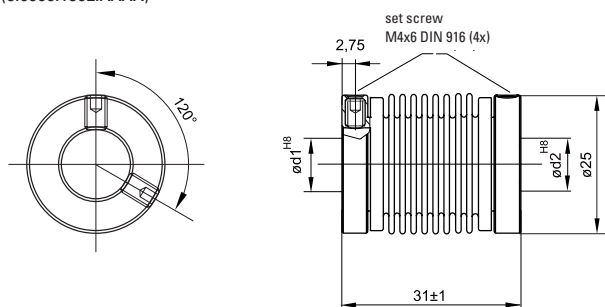
Bellows-type coupling $\varnothing 15$ [0.59]
(8.0000.1202.XXXX)



Bellows-type coupling $\varnothing 19$ [0.75]
(8.0000.1102.XXXX)



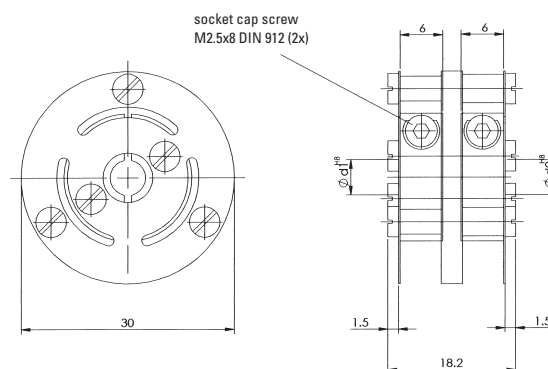
Bellows-type coupling $\varnothing 25$ [0.98]
(8.0000.1502.XXXX)



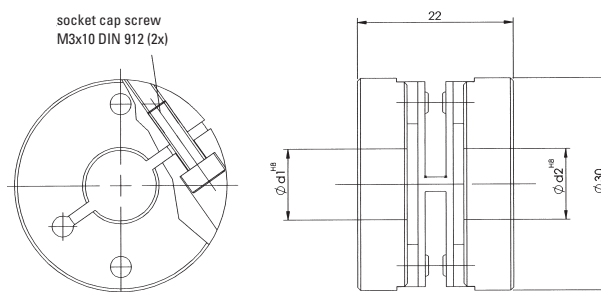
Spring washer-type couplings (.1301 und .1401)

Spring washer couplings are used primarily where high speeds and minimal axial errors occur. For applications requiring potential separation between the encoder and the drive, use the electrically isolating spring washer coupling.

Spring washer-type coupling, one-part
(8.0000.1301.XXXX)

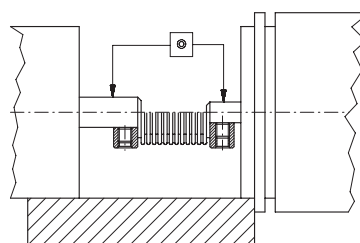


Spring washer-type coupling, three part, plug-in
(8.0000.1401.XXXX)



Installation instructions

1. Check shaft for displacement; see technical data for details.
2. Align and adjust coupling on shafts.
3. Tighten locking screws carefully. Avoid overtightening.
4. During installation protect the coupling from damage and from overbending.



Accessories

Connection of motor and encoder	Couplings	Bellows couplings (FS)
---------------------------------	-----------	------------------------



Bellows couplings provide cost-effective connection of the motor and encoder. They are also able to correct any angular errors between the drive and encoder.

These bellows couplings (FS) are used for safe connection of applications and Sendix SIL encoders.

The safety-oriented bellows coupling has, in addition to the metallic bellows, internal claws that ensure the driving of the encoder in case of breakage of the bellows connection.

Order code Couplings	8.0000 Type	. 1	X	FS	. XX	XX
		a			b	c
a Type of coupling 5 = bellows coupling ø 25 mm [0.98"]						
b Bore diameter d1 (see technical data)						
c Bore diameter d2 (see technical data)						
Example: d1 = 10 mm and d2 = 12 mm order no. = 8.0000.15FS.1012						

Accessory	Order no.
Screw retention Loctite 243, 5 ml	8.0000.4G05.0000

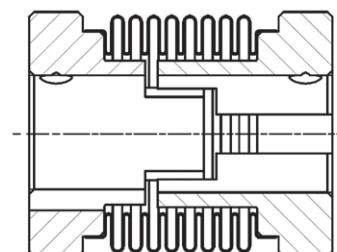
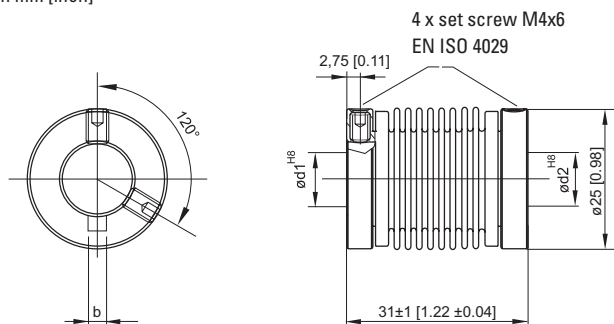
Technical data

Mechanical characteristics	
Max. speed	10000 min ⁻¹
Max. torque	200 Ncm
Max. shaft offset	radial ± 0.3 mm axial ± 0.45 mm angular ± 3°
Torsion spring stiffness	183 Nm/rad
Radial spring stiffness	17.8 N/mm
Moment of inertia	9.1 gcm ²
Headless set screw tightening torque	min. 80 Ncm max. 100 Ncm

Working temperature range	-30°C ... +120°C [-22 ... +248°F]
Weight approx.	54 g
Material	flange stainless steel 1.4104 bellows stainless steel 1.4571
Standard bore diameter	(d1 / d2) 10 / 10 mm [0.39 / 0.39"] 10 / 12 mm [0.39 / 0.47"] 12 / 12 mm [0.47 / 0.47"]
Insertion depth	min. 6 mm [0.24"] max. 11 mm [0.43"]

Dimensions

Dimensions in mm [inch]



Nut DIN 6885

nut width b	d1 / d2
3 [0.12]	10 [0.39]
4 [0.16]	12 [0.47]

Accessories

Connection of motor and encoder

Flexible shaft coupling

Double loop coupling



The safe, uncomplicated and economical solution, if drive shafts with angular, radial and/or axial displacement are to be friction-locked together.

Order no. size 1

Bore diameter both sides 6 mm [0.24"]

8.0000.1J01.0606

Order no. size 2

Bore diameter both sides 10 mm [0.39"]

8.0000.1K01.1010 ¹⁾

Bore diameter 11 mm [0.43"] and 12 mm [0.47"] with keyway

8.0000.1L01.1112

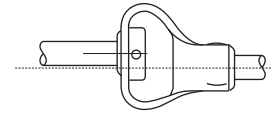
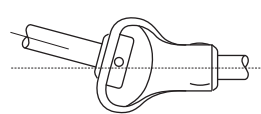
Technical data

		Size 1	Size 2
Max. speed		3000 min ⁻¹	3000 min ⁻¹
Max. torque		0.5 Nm	2.0 Nm
Max. offset of shafts	radial	± 2 mm	± 3 mm
	axial	± 2 mm	± 4 mm
	angular	± 10°	± 12°
Torsion spring stiffness		13 Nm/rad	28 Nm/rad
Radial spring stiffness		13 N/mm	7 N/mm
Moment of inertia		41 gcm ²	106 gcm ²
Max. clamping torque		100 Ncm	100 Ncm
Weight, approx.		33 g [1.16 oz]	85 g [3.35 oz]
Temperature range		-30°C ... + 80°C [-22°F ... +176°F]	
Material	flange	steel galvanized	
	connecting element	Polyurethane	

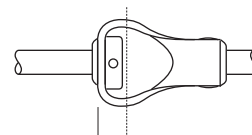
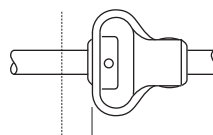
Functional principle

Compensation of an angular misalignment

Compensation of a radial misalignment



Compensation of a axial misalignment



1) Stock types

Accessories

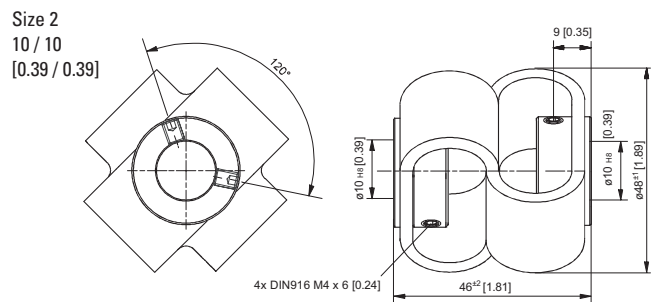
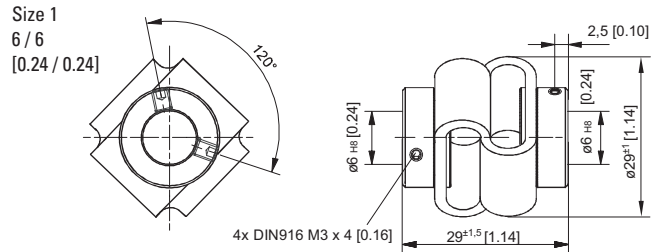
Connection of motor and encoder

Flexible shaft coupling

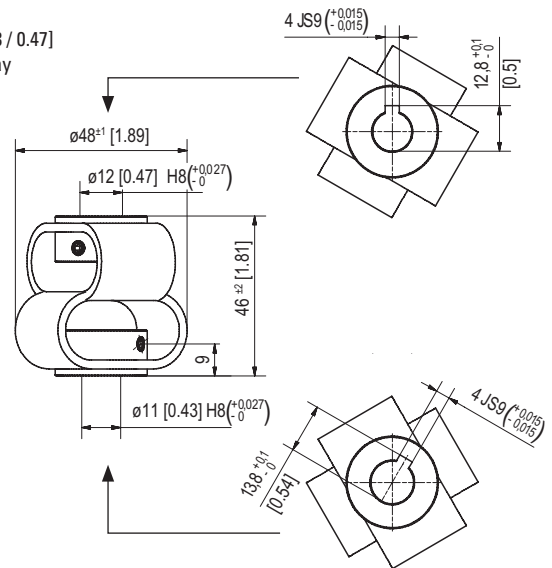
Double loop coupling

Dimensions

Dimensions in mm



Size 2
11 / 12 [0.43 / 0.47]
with keyway





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