

# Incremental encoders

<b>Standard optical</b>	<b>Sendix Base KIS50 / KIH50 (shaft / hollow shaft)</b>	<b>Push-pull / RS422 / Open collector</b>
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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	High protection level	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.

<b>Order code</b>	<b>8.KIS50</b>	<b>.XXXXX</b>	<b>.XXXX</b>			
<b>Shaft version</b>	Type	a	b	c	d	e

<p><b>a</b> Flange</p> <p>8 = clamping flange, IP65    <math>\varnothing</math> 58 mm [2.28"]</p> <p>B = synchro flange, IP65    <math>\varnothing</math> 58 mm [2.28"]</p> <p><b>b</b> Shaft (<math>\varnothing \times L</math>), with flat</p> <p>1 = <math>\varnothing</math> 6 x 10 mm [0.24 x 0.39"]</p> <p>6 = <math>\varnothing</math> 8 x 15 mm [0.32 x 0.59"]</p> <p>3 = <math>\varnothing</math> 10 x 20 mm [0.39 x 0.79"]</p> <p>D = <math>\varnothing</math> 10 x 20 mm [0.39 x 0.79"], on both sides <sup>1)</sup></p> <p>5 = <math>\varnothing</math> 12 x 20 mm [0.47 x 0.79"]</p> <p>8 = <math>\varnothing</math> 3/8 x 7/8"</p>	<p><b>c</b> Output circuit / supply voltage</p> <p>4 = RS422 / 5 V DC</p> <p>1 = RS422 / 5 ... 30 V DC</p> <p>2 = push-pull / 5 ... 30 V DC</p> <p>5 = push-pull / 10 ... 30 V DC</p> <p>3 = open collector / 5 ... 30 V DC</p> <p><b>d</b> Type of connection</p> <p>1 = axial cable, 1 m [3.28'] PVC</p> <p>2 = radial cable, 1 m [3.28'] PVC</p> <p>P = axial M12 connector, 5-pin</p> <p>R = radial M12 connector, 5-pin</p> <p>3 = axial M12 connector, 8-pin</p> <p>4 = radial M12 connector, 8-pin</p> <p>7 = axial M23 connector, 12-pin</p> <p>8 = radial M23 connector, 12-pin</p>	<p><b>e</b> Pulse rate</p> <p>100, 120, 200, 250, 256, 300, 360, 500, 512, 600, 1000, 1024, 1200, 2000, 2048, 2500, 3000, 3600, 4096, 5000</p> <p>(e.g. 100 pulses =&gt; 0100)</p> <p><i>High performance version (optionally available)</i></p> <ul style="list-style-type: none"> <li>- Extended temperature range</li> <li>- Higher rotational speed</li> <li>- Higher shock resistance</li> <li>- Higher vibration resistance</li> </ul> <p>Order code 8.KIS50.xxxx.xxxx.9888</p>
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1) Suitable for measuring wheel systems MWE52 or MWE62.  
Only available with flange option **a** = 8 and radial type of connection.

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<b>Order code</b>	<b>8.KIH50</b>	<b>.XXXXX</b>	<b>.XXXX</b>
<b>Hollow shaft</b>	Type	a b c d	e
<b>a Flange</b>	2 = with spring element, long, IP65 4 = with torque stop, long, IP65 D = with stator coupling, IP65, $\varnothing$ 63 mm [2.48"]	<b>c Output circuit / supply voltage</b> 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	<b>e Pulse rate</b> 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>b Through hollow shaft</b>	9 = $\varnothing$ 8 mm 4 = $\varnothing$ 3/8" (9,52 mm) 3 = $\varnothing$ 10 mm 5 = $\varnothing$ 12 mm 6 = $\varnothing$ 1/2" (12,75 mm) A = $\varnothing$ 14 mm 8 = $\varnothing$ 15 mm	<b>d Type of connection</b> 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	<b>High performance version (optionally available)</b> - 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.
<b>Coupling</b>	bellows coupling $\varnothing$ 19 mm [0.75"] for shaft 6 mm [0.24"] bellows coupling $\varnothing$ 19 mm [0.75"] for shaft 10 mm [0.39"]	<b>8.0000.1102.0606</b> <b>8.0000.1102.1010</b>

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

Cables and connectors		Order no.
<b>Preassembled cables</b>	M12 female connector with coupling nut, 8-pin, A coded, straight single ended 2 m [6.56'] PVC cable	<b>05.00.6041.8211.002M</b>
	M23 female connector with coupling nut, 12-pin, cw single ended 2 m [6.56'] PVC cable	<b>8.0000.6901.0002</b>
<b>Connectors</b>	M12 female connector with coupling nut, 8-pin, A coded, straight (metal)	<b>05.CMB 8181-0</b>
	M23 female connector with coupling nut, 12-pin, cw	<b>8.0000.5012.0000</b>

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

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## Technical data

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

Approvals	
<b>CE compliant</b> 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 <b>1</b>	<b>4</b>	<b>5</b>	<b>2</b>	<b>3</b>
<b>Supply voltage</b>	5 ... 30 V DC	5 V DC (±5 %)	10 ... 30 V DC	5 ... 30 V DC	5 ... 30 V DC
<b>Power consumption (no load)</b>	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
<b>Permissible load / channel</b>	max. +/- 20 mA	max. +/- 20 mA	max. +/- 20 mA	max. +/- 20 mA	20 mA sink at 30 V DC
<b>Pulse frequency</b>	max. 300 kHz	max. 300 kHz	max. 300 kHz	max. 300 kHz <sup>1)</sup>	max. 300 kHz
<b>Signal level</b>	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	
<b>Rising edge time t<sub>r</sub></b>	max. 200 ns	max. 200 ns	max. 1 µs	max. 1 µs	
<b>Falling edge time t<sub>f</sub></b>	max. 200 ns	max. 200 ns	max. 1 µs	max. 1 µs	
<b>Short circuit proof outputs <sup>2)</sup></b>	yes <sup>3)</sup>	yes <sup>3)</sup>	yes	yes	yes
<b>Reverse polarity protection of the supply voltage</b>	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

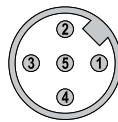
<b>Standard optical</b>	<b>Sendix Base KIS50 / KIH50 (shaft / hollow shaft)</b>	<b>Push-pull / RS422 / Open collector</b>
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## Terminal assignment

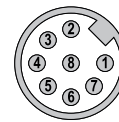
Output circuit	Type of connection	Cable (isolate unused cores individually before initial start-up)											
1, 2, 3, 4, 5	KIS50: 1, 2	Signal:	0 V	+V	0 Vsens	+Vsens	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	$\perp$
	KIH50: 1, E	Core color:	WH	BN	GY PK	RD BU	GN	YE	GY	PK	BU	RD	shield
Output circuit	Type of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

- +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)

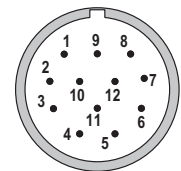
### Top view of mating side, male contact base



M12 connector, 5-pin



M12 connector, 8-pin



M23 connector, 12-pin

1) PH = shield is attached to connector housing.

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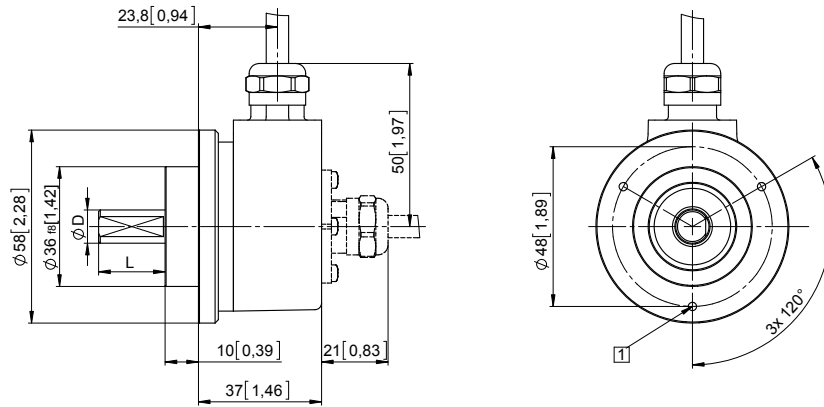
### Dimensions shaft version

Dimensions in mm [inch]

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

1 3 x M3, 6 [0.24] deep

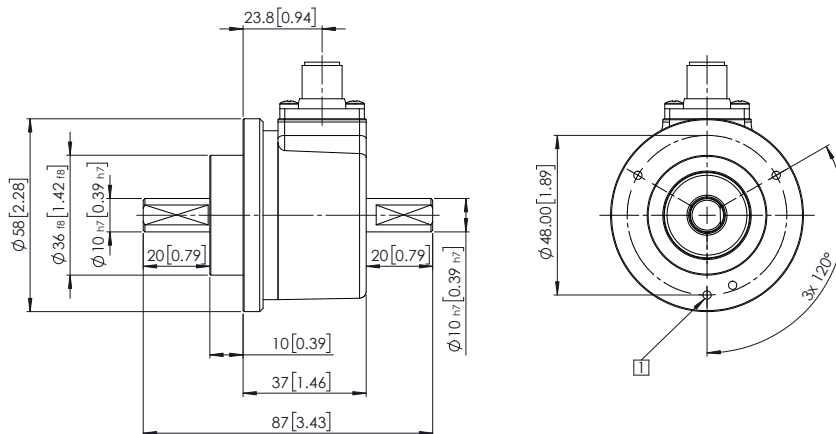
D	Fit	L
6 [0.24]	h7	10 [0.39]
8 [0.32]	h7	15 [0.59]
10 [0.39]	h7	20 [0.79]
12 [0.47]	h7	20 [0.79]



#### Clamping flange, $\varnothing$ 58 [2.28]

#### Flange type 8 and shaft $\varnothing$ 10 mm on both sides

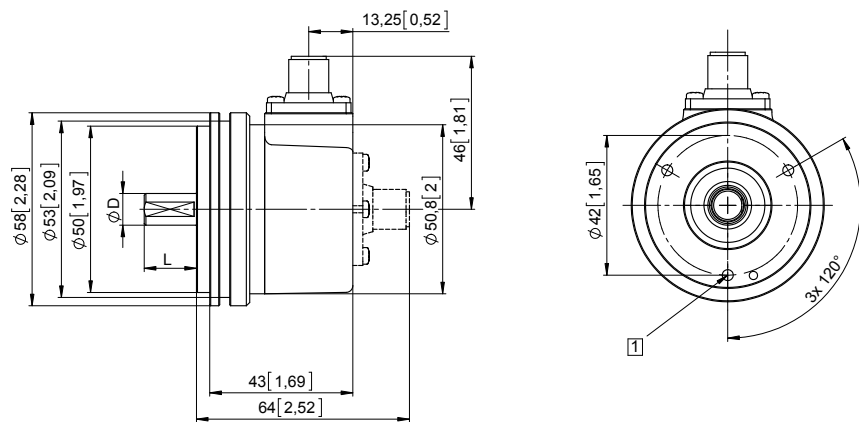
1 3 x M3, 6 [0.24] deep



#### Synchro flange, $\varnothing$ 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]

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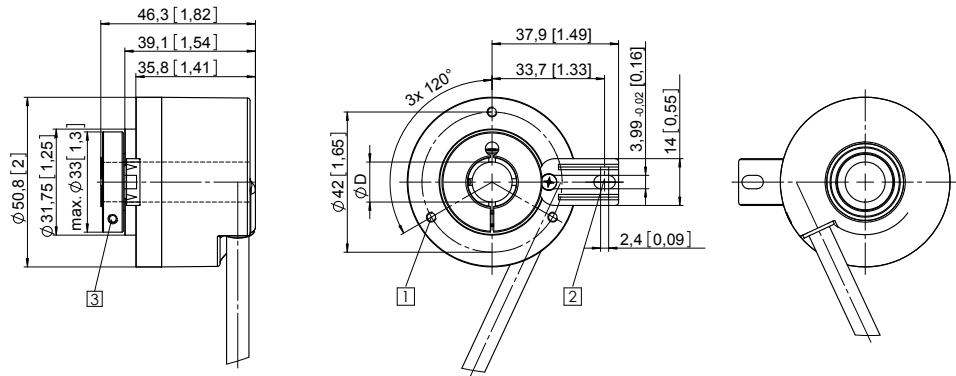
## Dimensions hollow shaft version

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

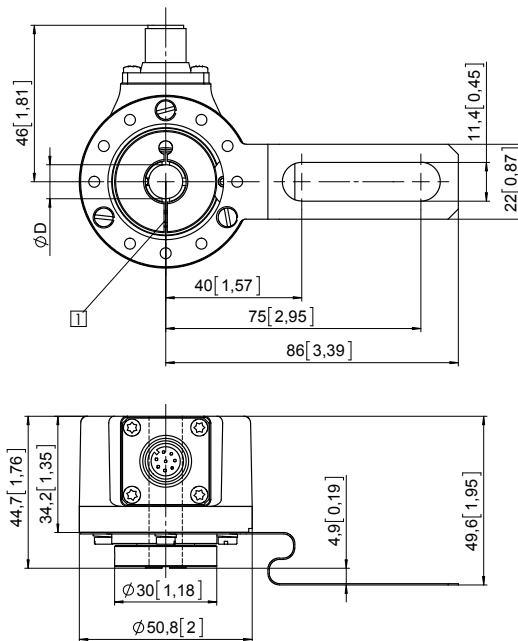
D	Fit
8 [0.32]	H7
10 [0.39]	H7
12 [0.47]	H7
14 [0.55]	H7
15 [0.59]	H7



### 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



### 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

