

# 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



High shaft load capacity



Shock / vibration resistant



Magnetic field proof



Short-circuit proof



Reverse polarity protection



Optical sensor

## Robust

- Resistant 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 . XXXX . XXXX . PXX 0X  
Type      a   b   c   d      e      f   g   h

#### a Flange

- 8 = clamping flange, IP65     $\varnothing$  58 mm [2.28"]
- B = synchro flange, IP65     $\varnothing$  58 mm [2.28"]
- D = square flange, IP65     $\varnothing$  63,5 mm [2.5"]

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

- 3 =  $\varnothing$  10 x 20 mm [0.39 x 0.79"]
- 5 =  $\varnothing$  12 x 20 mm [0.47 x 0.79"]
- 8 =  $\varnothing$  3/8 x 7/8"

#### c Output circuit / power supply

- 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
- 3 = open collector (with inverted signal) / 5 ... 30 V DC

#### d Type of connection

- 1 = axial cable, 1 m [3.28'] PVC
- 2 = radial cable, 1 m [3.28'] PVC
- 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, 200, 250, 256, 360, 500, 512, 600, 1000, 1024, 2000, 2048, 2500, 3600, 4096, 5000 (e.g. 100 pulses => 0100)

#### f Special output signal formats

- 00 = standard output
- other = see page 84

#### g Capacitor

- 0 = standard

#### h Special connector pin configuration

- 0 = standard wiring
- other = see page 84

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Order code Hollow shaft	8.KIH50 . XXXXX . XXXX . P XX 0 X <small>Type                    a b c d                    e                    f g h</small>	
<p><b>a</b> Flange 2 = with spring element, long, IP65 4 = with torque stop, long, IP65 D = with stator coupling, IP65, ø 63 mm [2.48"]</p> <p><b>b</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" A = ø 14 mm [0.55"] 8 = ø 15 mm [0.59"] 7 = ø 5/8"</p> <p><b>c</b> Output circuit / power supply 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 3 = open collector (with inverted signal) / 5 ... 30 V DC</p>	<p><b>d</b> Type of connection 1 = radial cable, 1 m [3.28'] PVC 2 = radial M12 connector, 8-pin 4 = radial M23 connector, 12-pin E = tangential cable, 1 m [3.28'] PVC</p> <p><b>e</b> Pulse rate 100, 200, 250, 256, 360, 500, 512, 600, 1000, 1024, 2000, 2048, 2500, 3600, 4096, 5000 (e.g. 100 pulses =&gt; 0100)</p>	<p><b>f</b> Special output signal formats 00 = standard output other = see page 84</p> <p><b>g</b> Capacitor 0 = standard</p> <p><b>h</b> Special connector pin configuration 0 = standard wiring other = see page 84</p>

Mounting accessory for shaft encoders	Order no.
<b>Coupling</b>	
bellows coupling ø 19 mm [0.75"] for shaft 6 mm [0.24"]	<b>8.0000.1102.0606</b>
bellows coupling ø 19 mm [0.75"] for shaft 10 mm [0.39"]	<b>8.0000.1102.1010</b>

Mounting accessory for hollow shaft encoders	Dimensions in mm [inch]	Order no.
<b>Cylindrical pin, long</b> for flange with spring element (flange type 2)	with fixing thread	<b>8.0010.4700.0000</b>

Connection technology	Order no.
<b>Cordset, pre-assembled</b>	
M12 female connector with coupling nut, 8-pin 2 m [6.56'] PVC cable	<b>05.00.6041.8211.002M</b>
M23 female connector with coupling nut, 12-pin 2 m [6.56'] PVC cable	<b>8.0000.6901.0002</b>
<b>Connector, self-assembly (straight)</b>	
M12 female connector with coupling nut, 8-pin	<b>05.CMB 8181-0</b>
M23 female connector with coupling nut, 12-pin	<b>8.0000.5012.0000</b>

Further accessories can be found in the accessories section or in the accessories area of our website at: [www.kuebler.com/accessories](http://www.kuebler.com/accessories).  
Additional connectors can be found in the connection technology section or in the connection technology area of our website at: [www.kuebler.com/connection\\_technology](http://www.kuebler.com/connection_technology).

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## Technical data

### Mechanical characteristics

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

### Electrical characteristics

Output circuit	RS422 (TTL compatible)	RS422 (TTL compatible)	Push-pull	Push-pull (7272 compatible)	Open collector (7273)
Order code	<b>1</b>	<b>4</b>	<b>5</b>	<b>2</b>	<b>3</b>
<b>Power supply</b>	5 ... 30 V DC	5 V DC (±5 %)	10 ... 30 V DC	5 ... 30 V DC	5 ... 30 V DC
<b>Power consumption</b> (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
<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</b> <sup>2)</sup>	yes <sup>3)</sup>	yes <sup>3)</sup>	yes	yes	yes
<b>Reverse polarity protection of the power supply</b>	yes	no	yes	no	no
<b>CE compliant</b> acc. to	EMC guideline 2014/30/EU RoHS guideline 2011/65/EU				

1) Max. recommended cable length 30 m [98.43'].  
2) If power supply 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.

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## Terminal assignment

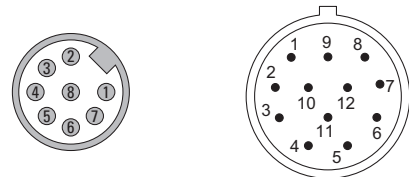
Output circuit	Type of connection	Cable (isolate unused wires individually before initial start-up)											
1, 2, 3, 4, 5	KIS50: 1, 2	Signal:	0 V	+V	0 Vsens	+Vsens	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	$\perp$
	KIH50: 1, E	Core color:	WH	BN	GY PK	RD BU	GN	YE	GY	PK	BU	RD	shield
Output circuit	Type of connection	M12 connector, 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>

## Terminal assignment – Special connector pin configuration

Order code <b>h</b>	Output circuit	Type of connection	M12 connector, 8-pin									
7	1, 2, 3, 4, 5	KIS50: 3, 4	Signal:	0 V	+V	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	$\perp$
		KIH50: 2	Pin:	7	2	1	3	4	5	6	8	PH <sup>1)</sup>
Order code <b>h</b>	Output circuit	Type of connection	M12 connector, 5-pin									
9	1, 2, 3, 4, 5	KIS50: 7, 8	Signal:	0 V	+V	A	B	0	$\perp$			
		KIH50: 4	Pin:	3	1	4	2	5	PH <sup>1)</sup>			

- +V: Encoder power supply +V DC
- 0 V: Encoder power supply 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



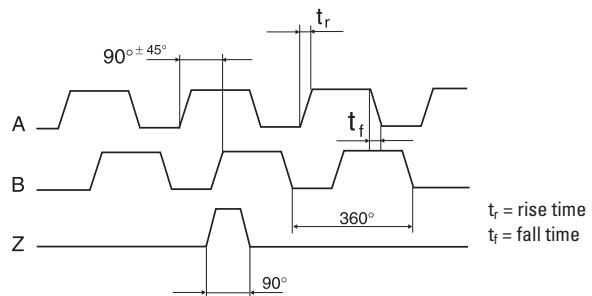
M12 connector, 8-pin

M23 connector, 12-pin

## Special output signal formats

All Kübler encoders come standard with six channels where A leads B in the clockwise direction and the standard index is gated with A & B. The tolerance of the wave form affects the control and, in some cases, may affect the smoothness of system operation.

### Wave form tolerances



<b>A leads B</b>			
when the shaft is rotated in the clockwise direction viewing the shaft or collet end. This is the Kübler standard. This format applies to the pin key codes listed below.		A	$\bar{A}$
		B	$\bar{B}$
Order code <b>f</b>		Z	$\bar{Z}$
	Z gated with A & B. This is the Kübler standard. Z is 90° wide.		

<b>B leads A</b>			
when the shaft is rotated in the clockwise direction viewing the shaft or collet end. This format applies to the pin key codes listed below.		A	$\bar{A}$
		B	$\bar{B}$
Order code <b>f</b>		Z	$\bar{Z}$
<b>04</b>	Z gated with A & B. Z is 90° wide.		

1) PH = shield is attached to connector housing.

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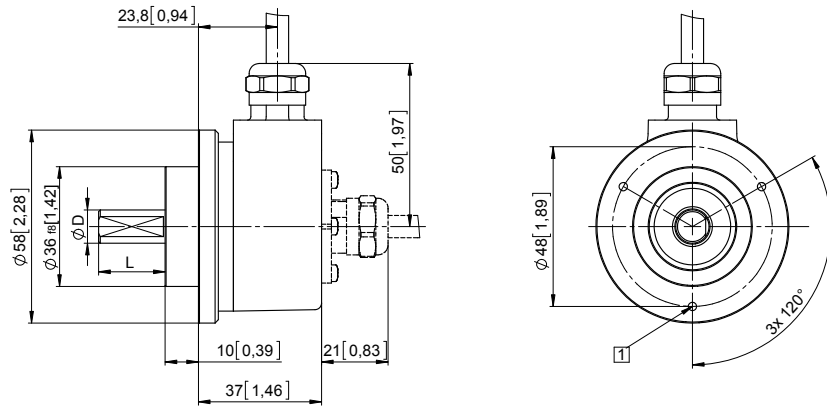
## Dimensions shaft version

Dimensions in mm [inch]

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

1 3 x M3, 6 [0.24] deep

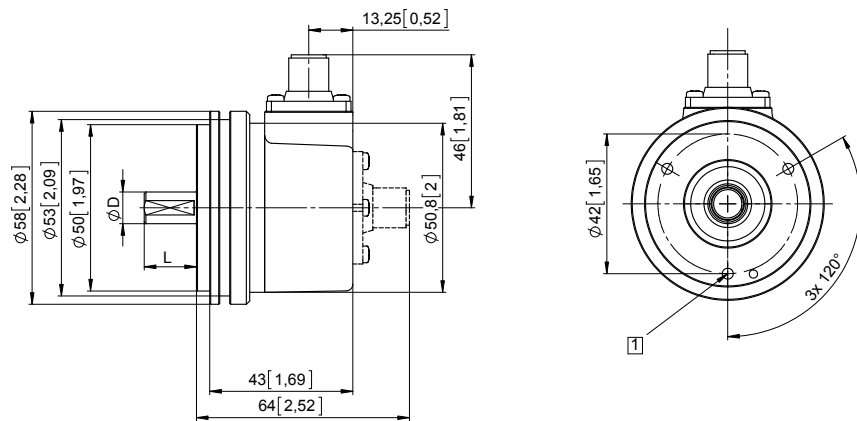
D	Fit	L
10 [0.39]	f7	20 [0.79]
12 [0.47]	h7	20 [0.79]
3/8"	h8	7/8"



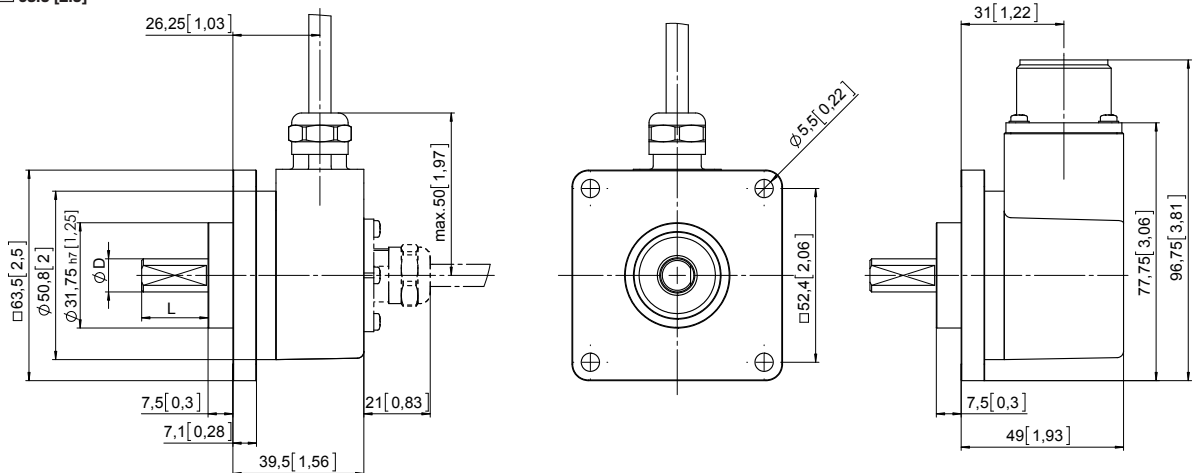
### Synchro flange, $\varnothing$ 58 [2.28] Flange type B

1 3 x M4, 6 [0.24] deep

D	Fit	L
10 [0.39]	f7	20 [0.79]
12 [0.47]	h7	20 [0.79]
3/8"	h8	7/8"



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



MIL-connector version

D	Fit	L
10 [0.39]	f7	20 [0.79]
12 [0.47]	h7	20 [0.79]
3/8"	h8	7/8"

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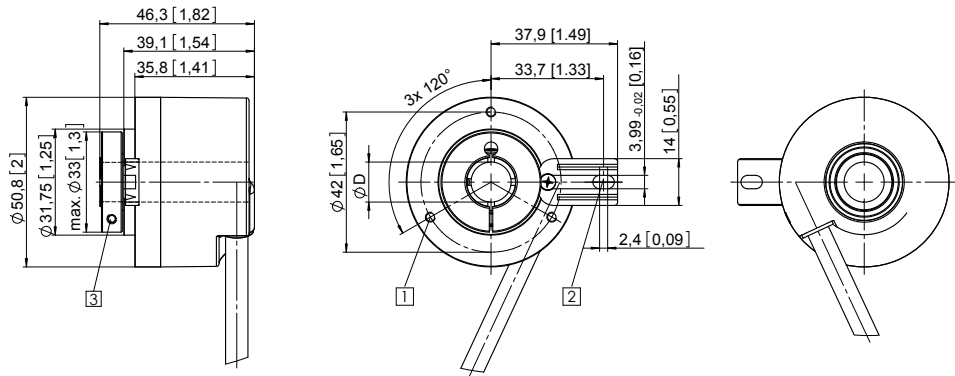
### Dimensions hollow shaft version

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: cylindrical pin DIN 7,  $\varnothing 4$  [0.16]
- 3 Recommended torque for the clamping ring 0.6 Nm

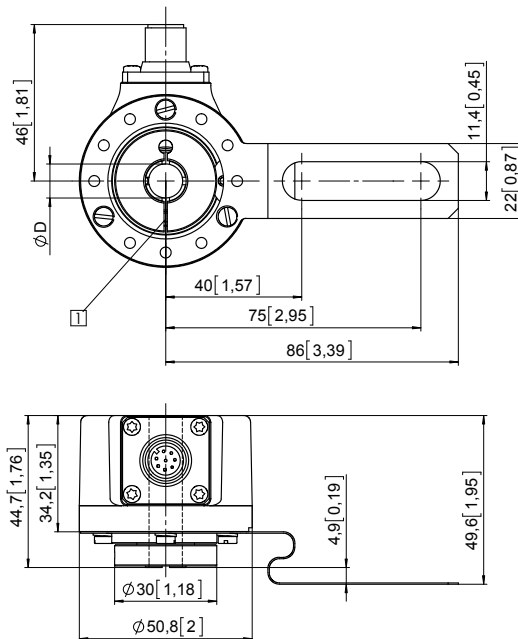
D	Fit
1/4"	H7
3/8"	H7
10 [0.39]	H7
12 [0.47]	H7
1/2"	H7
14 [0.55]	H7
15 [0.59]	H7
5/8"	H7



#### Flange with torque stop, long Flange type 4

- 1 Recommended torque for the clamping ring 0.6 Nm

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



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

- 1 Recommended torque for the clamping ring 0.6 Nm

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

