

Incremental encoders

Large hollow shaft optical	A020 (hollow shaft)	Push-pull / RS422 / SinCos
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The incremental encoder type A020 with optical sensor technology is available with a through hollow shaft up to max. 42 mm diameter.

With an installation depth of just 43 mm it is optimally suited for mounting on large shafts, even where space is tight.



High rotational speed	High protection level	Shock / vibration resistant	Magnetic field proof	Optical sensor

Compact

- Minimal installation depth but large hollow shaft.
- Available with compact M12 connector.
- Torque stop can be implemented even with small radius.

Flexible

- With push-pull, RS422 or SinCos interface.
- Hollow shaft from 20 mm up to 42 mm as standard.
- With cable connection, M12 or M23 connectors.

Order code Hollow shaft

8.A020	.	XXXXX	.	XXXX
Type		a b c d		e

a Flange

- 2 = with spring element, short
- 3 = with spring element, long
- 5 = with torque stop, long

b Through hollow shaft

- C = ø 20 mm [0.79"]
- 6 = ø 24 mm [0.94"]
- 5 = ø 25 mm [0.98"]
- 3 = ø 28 mm [1.10"]
- A = ø 30 mm [1.18"]
- 2 = ø 38 mm [1.50"]
- B = ø 40 mm [1.57"]
- 1 = ø 42 mm [1.65"]
- 4 = ø 1"

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
- 5 = Push-pull (with inverted signal) / 5 ... 30 V DC
- 3 = Push-pull (with inverted signal) / 10 ... 30 V DC
- A = Push-pull (7272 compatible) / 5 ... 30 V DC
- 8 = SinCos, 1 Vpp (with inverted signal) / 5 V DC
- 9 = SinCos, 1 Vpp (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
- E = radial M12 connector, 8-pin

*) Available special lengths (connection type A):
 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.A020.351A.2048.0030 (for cable length 3 m)

e Pulse rate

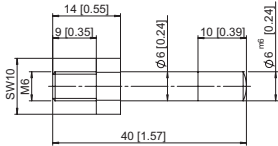
- 50, 360, 512, 600, 1000, 1024, 1500, 2000, 2048, 2500, 4096, 5000 (e.g. 360 pulses => 0360)

SinCos version only available with pulses ≥ 1024

Optional on request - other pulse rates

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Mounting accessory for hollow shaft encoders	Dimensions in mm [inch]	Order no.
Torque pin, \varnothing 6 mm for flange with spring element (flange type 2 + 3)	with fixing thread 	8.0010.4700.0003
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	8.0000.6201.0002
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 (metal)	8.0000.5012.0000

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

Technical data

Mechanical characteristics	
Maximum speed	3000 min ⁻¹ 1)
Mass moment of inertia 2)	< 150 x 10 ⁻⁶ kgm ²
Starting torque with sealing at 20 °C [68 °F]	< 0.2 Nm
Weight	approx. 0.7 kg [24.69 oz]
Protection acc. to EN 60529	IP65
Working temperature range	-40 °C 3) ... +70 °C [-40 °F 3) ... +158 °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

Approvals		
UL compliant in accordance with		File no. E224618
CE compliant in accordance with		
	EMC Directive	2014/30/EU
	RoHS Directive	2011/65/EU
UKCA compliant in accordance with		
	EMC Regulations	S.I. 2016/1091
	RoHS Regulations	S.I. 2012/3032

Electrical characteristics SinCos output			
Output circuit	SinCos U = 1 Vpp	SinCos U = 1 Vpp	
Supply voltage	5 V DC (±5 %)	10 ... 30 V DC	
Power consumption with inverted signal (no load)	typ. 65 mA max. 110 mA	typ. 65 mA max. 110 mA	
-3 dB frequency	≤180 kHz	≤180 kHz	
Signal level	channels A/B channel 0	1 Vpp (±20 %) 0.1 ... 1.2 V	1 Vpp (±20 %) 0.1 ... 1.2 V
Short circuit proof outputs 4)	yes	yes	
Reverse polarity protection of the supply voltage	no	yes	

1) Short term (app. 15 min. range) up to 3500 min⁻¹.
 2) Depending on shaft diameter.
 3) With connector: -40 °C [-40 °F], securely installed: -30 °C [-22 °F], flexibly installed: -20 °C [-4 °F].
 4) If supply voltage correctly applied.

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Electrical characteristics			
Output circuit	RS422 (TTL compatible)	Push-pull	Push-pull (7272 compatible)
Supply voltage	5 V DC ($\pm 5\%$) 10 ... 30 V DC	5 ... 30 V DC 10 ... 30 V DC	5 ... 30 V DC
Power consumption (no load)			
without inverted signal	–	typ. 55 mA/max. 125 mA	–
with inverted signal	typ. 40 mA/max. 90 mA	typ. 80 mA/max. 150 mA	typ. 50 mA/max. 100 mA
Permissible load / channel	max. +/- 20 mA	max. +/- 30 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 - 3.0 V max. 2.5 V	min. +V - 2.0 V max. 0.5 V
Rising edge time t_r	max. 200 ns	max. 1 μ s	max. 1 μ s
Falling edge time t_f	max. 200 ns	max. 1 μ s	max. 1 μ s
Short circuit proof outputs ¹⁾	yes ²⁾	yes	yes
Reverse polarity protection of the supply voltage	no, 10 ... 30 V DC: yes	yes	no

Terminal assignment

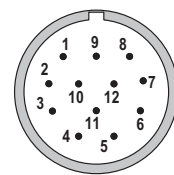
Output circuit	Type of connection	Cable (isolate unused cores individually before initial start-up)												
1 ... A	1, A	Signal:	0 V	+V	0 Vsens	+Vsens	A	\bar{A}	B	\bar{B}	0	$\bar{0}$	\perp	
		Core color:	WH	BN	GY PK	RD BU	GN	YE	GY	PK	BU	RD	shield	
Output circuit	Type of connection	M23 connector, 12-pin												
1 ... A	2	Signal:	0 V	+V	0 Vsens	+Vsens	A	\bar{A}	B	\bar{B}	0	$\bar{0}$	\perp	
		Pin:	10	12	11	2	5	6	8	1	3	4	PH ³⁾	
Output circuit	Type of connection	M12 connector, 8-pin												
1 ... A	E	Signal:	0 V	+V	0 Vsens	+Vsens	A	\bar{A}	B	\bar{B}	0	$\bar{0}$	\perp	
		Pin:	1	2	–	–	3	4	5	6	7	8	PH ³⁾	

- +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, 8-pin



M23 connector, 12-pin

1) PH = shield is attached to connector housing.

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Dimensions hollow shaft version

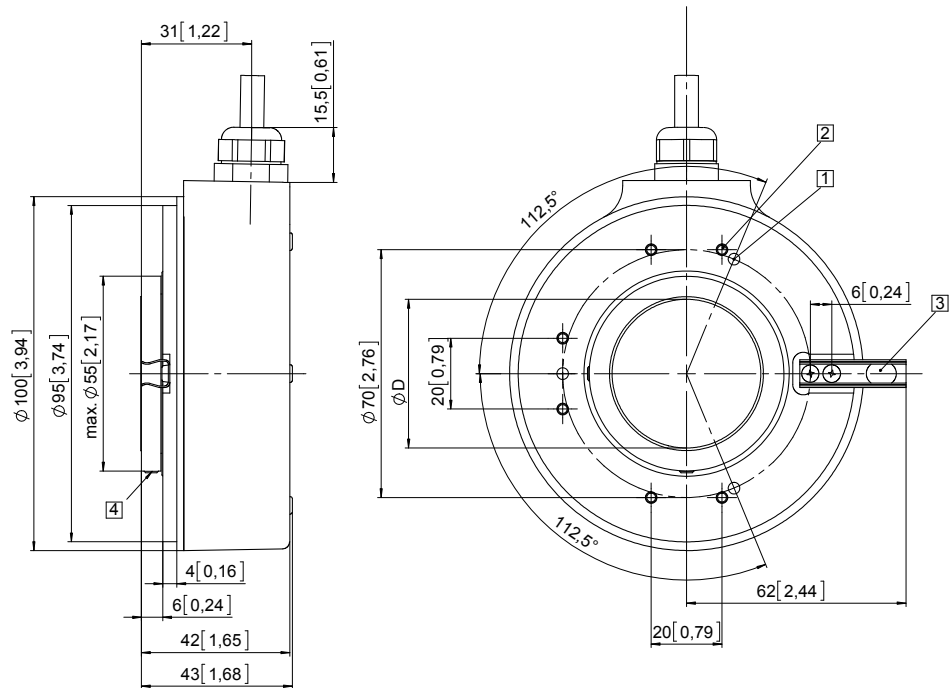
Dimensions in mm [inch]

Flange with spring element, long Flange type 3

- 1 3 x M4, 7 [0.28] deep
- 2 6 x M3, 8 [0.31] deep
- 3 Torque pin DIN 6325, \varnothing 6 [0.24]
- 4 Recommended torque for the clamping ring 1.0 Nm

D	Fit
20 [0.79]	H7
24 [0.94]	H7
25 [0.98]	H7
28 [1.10]	H7
30 [1.18]	H7
38 [1.50]	H7
40 [1.57]	H7
42 [1.65]	H7
1"	H7

Typ. insertion depth: 1.5 x D
up to L hollow shaft max.



Flange with torque stop, long Flange type 5

- 1 Recommended torque for the clamping ring 1.0 Nm

D	Fit
20 [0.79]	H7
24 [0.94]	H7
25 [0.98]	H7
28 [1.10]	H7
30 [1.18]	H7
38 [1.50]	H7
40 [1.57]	H7
42 [1.65]	H7
1"	H7

Typ. insertion depth: 1.5 x D
up to L hollow shaft max.

