

Incremental encoders

Large hollow shaft optical

A020 (hollow shaft)

Push-pull / RS422 / SinCos



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

c Output circuit / power supply

- 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, without mating connector
- 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 $\geq$ 1024

Optional on request
- other pulse rates

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Mounting accessory for hollow shaft encoders		Dimensions in mm [inch]	Order no.
Cylindrical pin, long for flange with spring element (flange type 2 + 3)	with fixing thread		8.0010.4700.0003
Connection technology			Order no.
Cordset, pre-assembled	M12 female connector with coupling nut, 8-pin 2 m [6.56'] PVC cable		05.00.6041.8211.002M
	M23 female connector with coupling nut, 12-pin 2 m [6.56'] PVC cable		8.0000.6201.0002
Connector, self-assembly (straight)	M12 female connector with coupling nut, 8-pin		05.CMB 8181-0
	M23 female connector with coupling nut, 12-pin		8.0000.5012.0000

Further accessories can be found in the accessories section or in the accessories area of our website at: 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.

Technical data			
Mechanical characteristics		Electrical characteristics SinCos output	
Maximum speed	3000 min ⁻¹ 1)	Output circuit	SinCos U = 1 Vpp
Mass moment of inertia 2)	< 150 x 10 ⁻⁶ kgm ²	Power supply	5 V DC (±5 %)
Starting torque with sealing at 20°C [68°F]	< 0.2 Nm	Power consumption with inverted signal (no load)	typ. 65 mA max. 110 mA
Weight	approx. 0.7 kg [24.69 oz]	-3 dB frequency	≤180 kHz
Protection acc. to EN 60529	IP65	Signal level channels A/B channel 0	1 Vpp (±20 %) 0.1 ... 1.2 V
Working temperature range	-40°C 3) ... +70°C [-40°F 3) ... +158°F]	Short circuit proof outputs 4)	yes
Material shaft	stainless steel H7	Reverse polarity protection of the power supply	no
Shock resistance acc. to EN 60068-2-27	1000 m/s ² , 6 ms	UL approval	file 224618
Vibration resistance acc. to EN 60068-2-6	100 m/s ² , 10 ... 2000 Hz	CE compliant acc. to	EMC guideline 2014/30/EU RoHS guideline 2011/65/EU

1) Short term (app. 15 min. range) up to 3500 min^{-1} .

- 1) Short term (app. 15 min.) range
- 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 power supply correctly applied.

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Electrical characteristics			
Output circuit	RS422 (TTL compatible)	Push-pull	Push-pull (7272 compatible)
Power supply	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 power supply	no, 10 ... 30 V DC: yes	yes	no
UL approval	file 224618		
CE compliant acc. to	EMC guideline 2014/30/EU RoHS guideline 2011/65/EU		

Incremental encoders

Terminal assignment

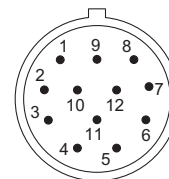
Output circuit	Type of connection	Cable (isolate unused wires individually before initial start-up)											
1 ... A	1, A	Signal:	0 V	+V	0 Vsens	+Vsens	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	$\perp$
		Core color:	WH	BN	GY PK	RD BU	GN	YE	GY	PK	BU	RD	shield
Output circuit	Type of connection	M23 connector, 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: 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

1) PH = shield is attached to connector housing.

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Dimensions hollow shaft version

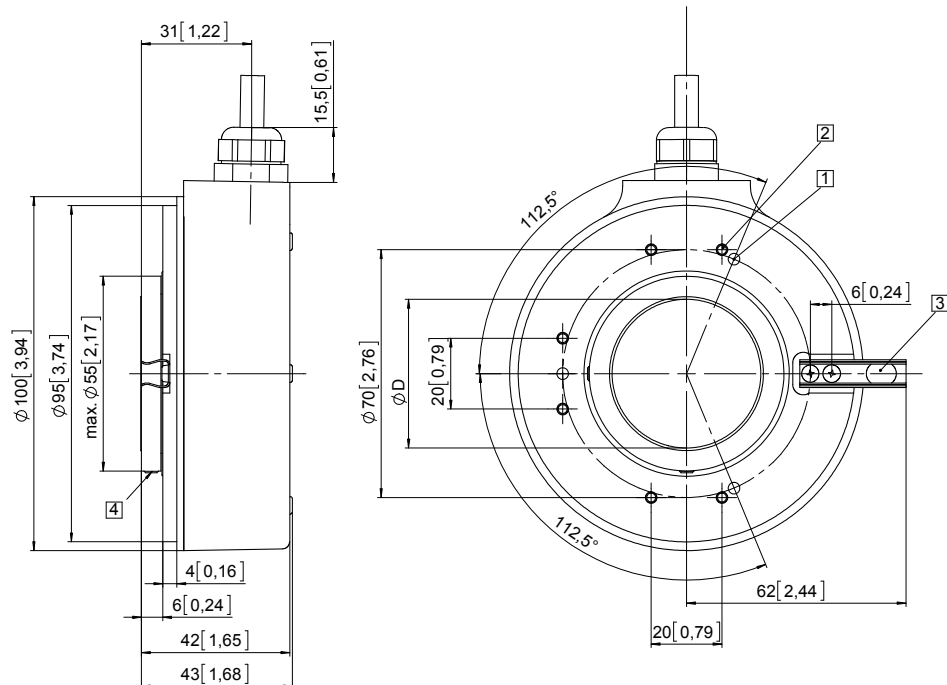
Dimensions in mm [inch]

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 Cylindrical 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.

