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	.	X	X	X	X	.	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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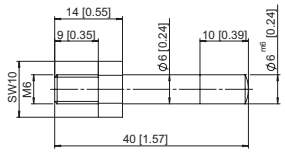
Mounting accessory for hollow shaft encoders

Dimensions in mm [inch]

		Order no.
Torque pin, ø 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

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.

Large hollow shaft optical	A020 (hollow shaft)	Push-pull / RS422 / SinCos

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 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	min. +V - 3.0 V	min. +V - 2.0 V
	LOW	max. 0.5 V	max. 2.5 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 [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	$\overline{A}$	B	$\overline{B}$	0	$\overline{0}$	⏚
		Core color:	WH	BN	GY PK	RD BU	GN	YE	GY	PK	BU	RD	shield

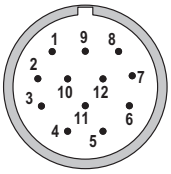
Output circuit	Type of connection	M23 connector, 12-pin										
1 ... A	2	Signal:	0 V	+V	0 Vsens	+Vsens	A	$\overline{A}$	B	$\overline{B}$	0	$\overline{0}$	⏚
		Pin:	10	12	11	2	5	6	8	1	3	4	PH [3]

Output circuit	Type of connection	M12 connector, 8-pin										
1 ... A	E	Signal:	0 V	+V	0 Vsens	+Vsens	A	$\overline{A}$	B	$\overline{B}$	0	$\overline{0}$	⏚
		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, $\overline{A}$: Incremental output channel A
B, $\overline{B}$: Incremental output channel B
0, $\overline{0}$: Reference signal
PH ⏚: 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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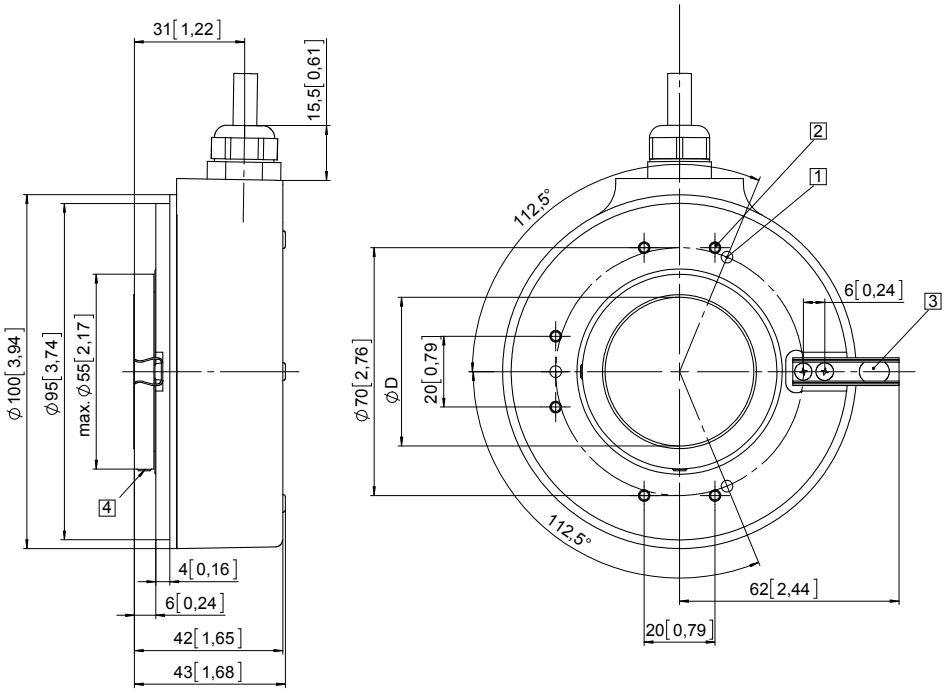
Dimensions hollow shaft version

Dimensions in mm [inch]

Flange with spring element, long
Flange type 3

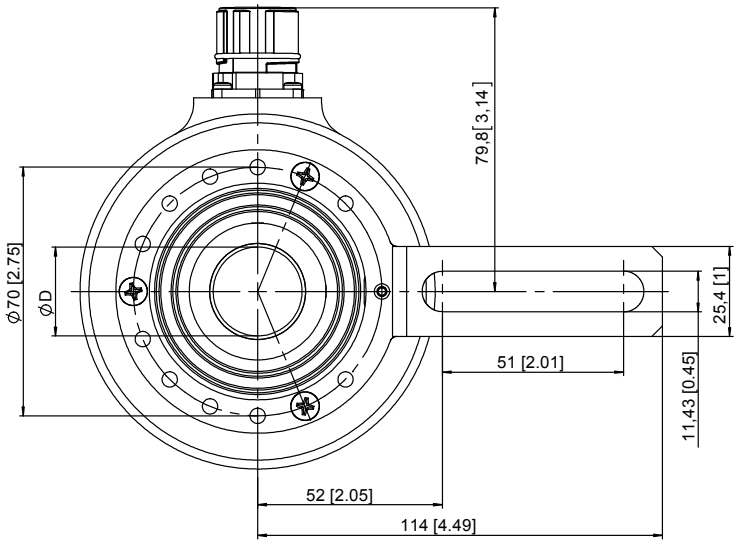
1 3 x M4, 7 [0.28] deep
2 6 x M3, 8 [0.31] deep
3 Torque pin DIN 6325, ø 6 [0.24]
4 Recommended torque for the clamping ring 1.0 Nm



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.