Large hollow shaft robust, optical | A02H (hollow shaft) | Push-Pull / RS422 / SinCos

The Heavy Duty incremental encoder type A02H boasts a high degree of ruggedness in a very compact design.

Its special construction makes it perfect for all applications in very harsh environments.

Ex 2/22 | cULus | RoHS | GL Renewables Certification, LETTER OF CONFORMITY NO. 74130


High rotational speed

High protection level


High shaft load capacity


Shock / vibration resistant


Magnetic field proof


Optical sensor

Heavy Duty - robust

- Special shaft connection with interlocked bearings.
- Balanced stainless steel clamping ring.
- Optional isolation inserts available to protect against shaft currents.

Compact and versatile

- Only 49 mm installation depth.
- With cable connections, M12, M23 or MIL connectors.
- With Push-Pull, RS422 or SinCos interface.

Order code Hollow shaft

8.A02H	.	X	X	X	X	.	XXXX
Type		a	b	c	d		e

a *Flange*
1 = without mounting aid
2 = with spring element, short
3 = with spring element, long
5 = with fastening arm, long

6 = with fastening arm, short, 4.5" [1]

b *Hollow shaft*
C = ø 20 mm [0.79"]
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''

E = ø 5/8" [1]
N = ø 1 1/4" [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
8 = SinCos, 1 Vpp (with inverted signal) / 5 V DC
9 = SinCos, 1 Vpp (with inverted signal) / 10 ... 30 V DC
A = Push-pull (7272 compatible) / 5 ... 30 V DC

D = RS422 (with inverted signal) / 5 ... 30 V DC [1]

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

D = MIL connector, 10-pin [1]

*) 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.A02H.111A.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 on request
- Ex 2/22 [2]

1) US version.
2) For the cable connection type, cable material PUR.

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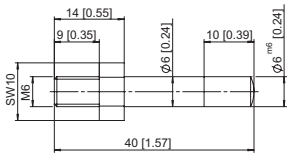
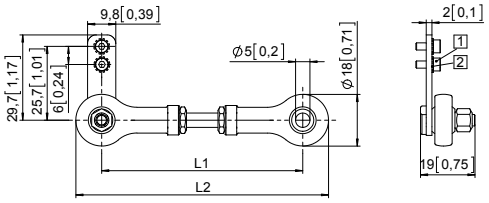
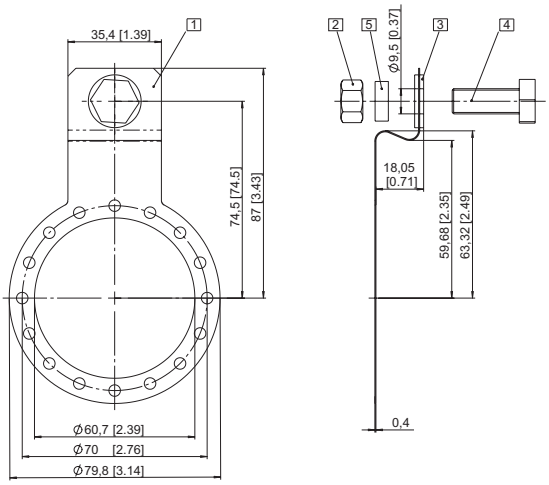
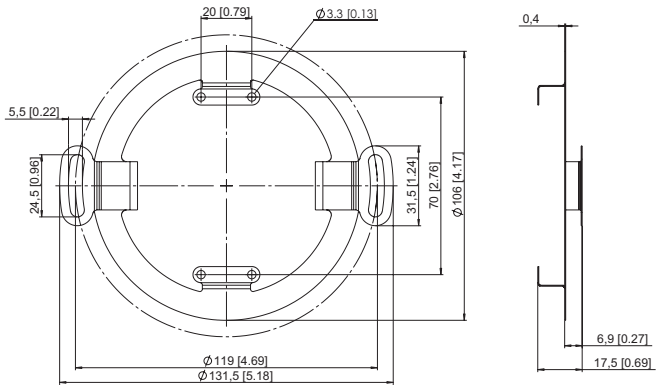
Mounting accessory for hollow shaft encoders	Dimensions in mm [inch]		Order no.
Cylindrical pin, long for torque stops		with fixing thread	**8.0010.4700.0003**
Tether arm, flexible		70 mm [2.76"] 100 mm [3.94"] 150 mm [5.91"]	**8.0010.40S0.0000** **8.0010.40T0.0000** **8.0010.40U0.0000**
[1] Socket screw M2.5 x 6 [0.24] [2] Lock washer			
Fastening arm, short			**8.0010.4T00.0000**
[1] Curved spring element [2] Hexagonal nut 3/8 - 16 UNC [3] Washer (isolating) [4] Hexagonal screw 3/8 16 UNC x 1" [5] Washer D10.4 x 15 x 15			
Stator coupling			**8.0010.40V0.0000**
			

Tether arm	L1	L2
70 mm [2.76"]	64 ... 74 [2.51 ... 2.91]	82 ... 92 [3.23 ... 3.62]
100 mm [3.94"]	94 ... 104 [3.70 ... 4.09]	112 ... 122 [4.41 ... 4.80]
150 mm [5.91"]	144 ... 154 [5.67 ... 6.06]	162 ... 172 [6.38 ... 6.77]

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Mounting accessory for hollow shaft encoders

Order no.

Protective cover

For applications with a very high degree of pollution, Kübler now offers a protective cover for
- Improved reliability
- Extension of the service life of the encoder

Scope of delivery:
- Protective cover
- Fastening arm (8.0010.4T00.0000)
- 3 screws for fixing to the encoder

8.0010.40Y0.0001

Tapered shaft mounting kit

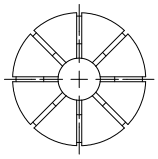
for A02H with hollow shaft, ø 38 mm [1.50"]

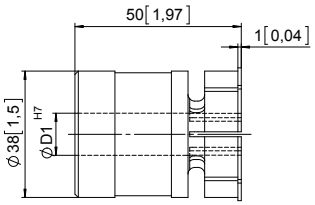
For use in upgrading for tapered shaft mounting. Tapered shafts are used for high-precision direct coupling.
An isolation insert is also included in the mounting kit; this reliably protects the encoder from shaft currents.
Included in the set:
- Insert for cone blind hole, cone 1:10, 17 mm [0.67"] length
- Isolation insert
- Allen screw for central fixing

8.0010.4028.0000

Isolation insert for hollow shaft, ø 38 mm [1.50"]

Temperature range -40°C ... +115°C [-40°F ... +239°F]





Isolation inserts prevent currents from passing through the encoder bearings. These currents can occur when using inverter controlled three-phase or AC ector motors and considerably shorten the service life of the encoder bearings. For more details please call our technical hotline (+49 7720 3903 92) or send us an email (info@kuebler.com)

ø D1:	
12 mm [0.47"]	**8.0010.4091.0000**
14 mm [0.55"]	**8.0010.4027.0000**
15 mm [0.59"]	**8.0010.4038.0000**
16 mm [0.63"]	**8.0010.4019.0000**
18 mm [0.71"]	**8.0010.4080.0000**
20 mm [0.79"]	**8.0010.4011.0000**
25 mm [0.98"]	**8.0010.4012.0000**
30 mm [1.18"]	**8.0010.4016.0000**
32 mm [1.26"]	**8.0010.4015.0000**
1/2"	**8.0010.4013.0000**
5/8"	**8.0010.4070.0000**
3/4"	**8.0010.4090.0000**
1"	**8.0010.4050.0000**
1 1/4"	**8.0010.4060.0000**

Isolation insert for hollow shaft, ø 42 mm [1.65"]

external diameter 42 mm [1.65"] / internal diameter 38 mm [1.50"]	**8.0010.4017.0000**
external diameter 42 mm [1.65"] / internal diameter 12 mm [0.47"]	**8.0010.4029.0000**

Connection technology

Order no.

Connector, self-assembly (straight)	M12 female connector with coupling nut	**05.CMB 8181-0**
	M23 female connector with coupling nut	**8.0000.5012.0000**
Cordset, pre-assembled	M12 female connector with coupling nut, 2 m [6.56'] PVC cable	**05.00.6041.8211.002M**
	M23 female connector with coupling nut, 2 m [6.56'] PVC cable	**8.0000.6201.0002**

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.

Large hollow shaft robust, optical | **A02H (hollow shaft)** | **Push-Pull / RS422 / SinCos**

Technical data

Mechanical characteristics

Maximum speed		6000 min^{-1} 1) 2500 min^{-1} 1)
	at 60°C [140°F]	
Mass moment of inertia		< 220 x 10^{-6} kgm^2 2)
Starting torque with sealing at 20°C [68°F]		< 0.2 Nm
Load capacity of shaft	radial	200 N
	axial	100 N
Weight		approx. 0.8 kg [28.22 oz]
Protection acc. to EN 60529		IP65
Working temperature range		-40°C 3) ... +80°C [-40°F 3) ... +176°F]
Materials	shaft	stainless steel, bore tolerance H7
Shock resistance acc. to EN 60068-2-27		2000 m/s^2, 6 ms
Vibration resistance acc. to EN 60068-2-6		100 m/s^2, 10 ... 2000 Hz

Electrical characteristics SinCos output

Output circuit		**SinCos U = 1 Vpp**	**SinCos U = 1 Vpp**
Power supply		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	1 Vpp (±20 %)	1 Vpp (±20 %)
	channel 0	0.1 ... 1.2 V	0.1 .... 1.2 V
Short circuit proof outputs 4)		yes	yes
Reverse polarity protection of the power supply		no	yes
UL approval		file 224618	
GL approval		letter of conformity No. 74130	
CE compliant acc. to		EMC guideline 2014/30/EU RoHS guideline 2011/65/EU	

Electrical characteristics RS422 / Push-Pull

Output circuit		**RS422** (TTL compatible)	**Push-Pull**	**Push-Pull** (7272 compatible)
Power supply		5 V DC (±5 %) 5 ... 30 V DC 10 ... 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 5)
Signal level	HIGH	min. 2.5 V	min. +V – 3 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 4)		yes	yes	yes
Reverse polarity protection of the power supply		no, 10 ... 30 V DC: yes	yes	no
UL approval		file 224618		
GL approval		letter of conformity No. 74130		
CE compliant acc. to		EMC guideline 2014/30/EU RoHS guideline 2011/65/EU		

1) During the run-in-phase of approx. 2 hours, reduce the limits for working temperature$_{max}$ or speed max by 1/3.
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.
5) Max. recommended cable length 30 m [98.43'].

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Terminal assignment

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

Output circuit	Type of connection	M23 connector, 12-pin											
1 ... D	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 [1]

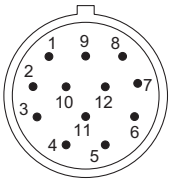
Output circuit	Type of connection	M12 connector, 8-pin											
1 ... D	E	Signal:	0 V	+V	0 Vsens	+Vsens	A	$\overline{A}$	B	$\overline{B}$	0	$\overline{0}$	⏚
		Pin:	1	2			3	4	5	6	7	8	PH [1]

Output circuit	Type of connection	MIL connector, 10-pin											
1 ... D	D	Signal:	0 V	+V	0 Vsens	+Vsens	A	$\overline{A}$	B	$\overline{B}$	0	$\overline{0}$	⏚
		Pin:	F	D			A	G	B	H	C	I	J

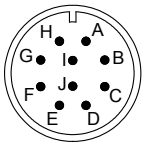
+V: Encoder power supply +V DC
0 V: Encoder power supply ground GND (0 V)
0 V_{sens} / +V_{sens}: Using the sensor outputs of the encoder, the voltage present can be measured and if necessary increased accordingly.
A, $\overline{A}$: Incremental output channel A
B, $\overline{B}$: Incremental output 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



MIL connector, 10-pin

1) PH = shield is attached to connector housing.

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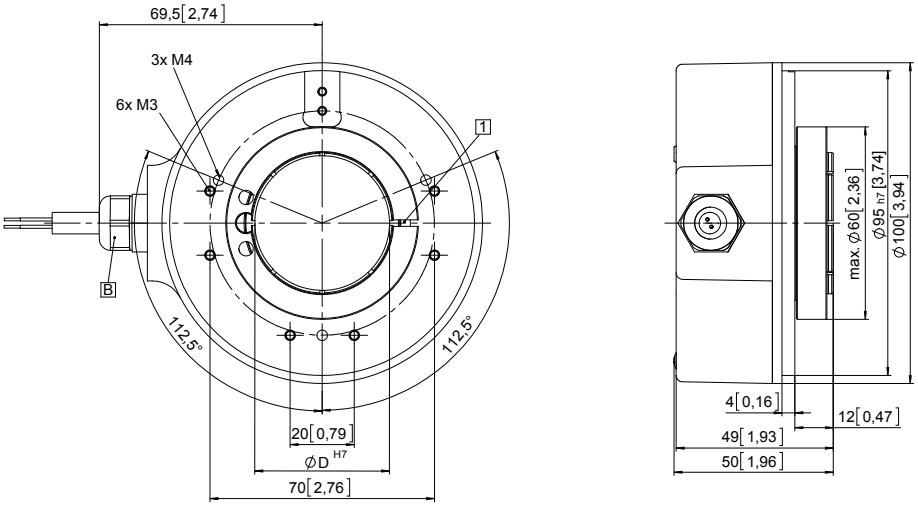
Dimensions hollow shaft version

Dimensions in mm [inch]

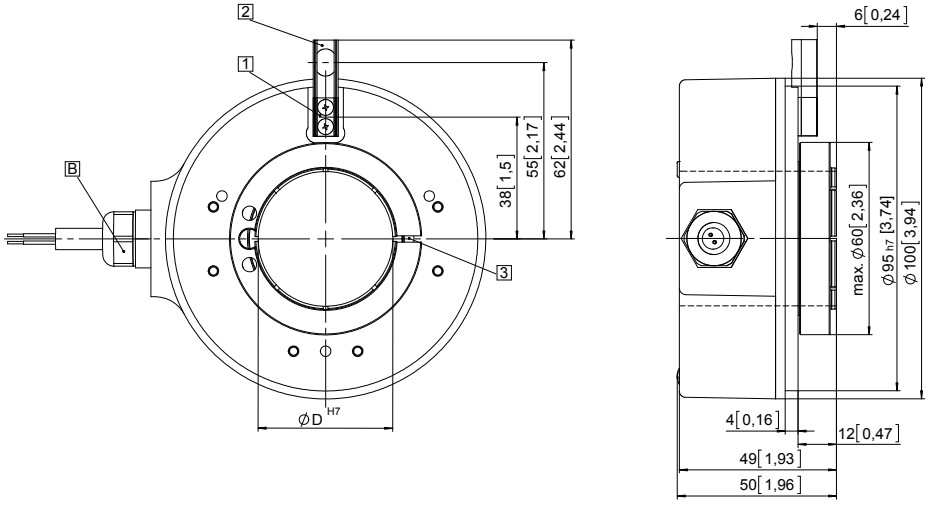
Flange without mounting aid
Flange type 1

1 Recommended torque for the clamping ring 1.0 Nm
B Cable version



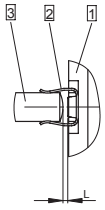
Flange with spring element
Flange type 2 and 3

1 Spring element, short (flange type 2)
2 Spring element, long (flange type 3)
3 Recommended torque for the clamping ring
flange type 2: 1.0 Nm
flange type 3: 2.0 Nm
B Cable version



Mounting using the spring element, short

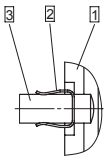
When mounting the encoder, ensure that dimension L is larger than the maximum axial play of the drive in the direction of the arrow.
Danger of mechanical seizure!



1 Flange
2 Spring element, short
3 Cylindrical pin

Mounting using the spring element, long

Cylindrical pin fed through the bore of the spring



1 Flange
2 Spring element, long
3 Cylindrical pin

Large hollow shaft robust, optical | **A02H (hollow shaft)** | **Push-Pull / RS422 / SinCos**

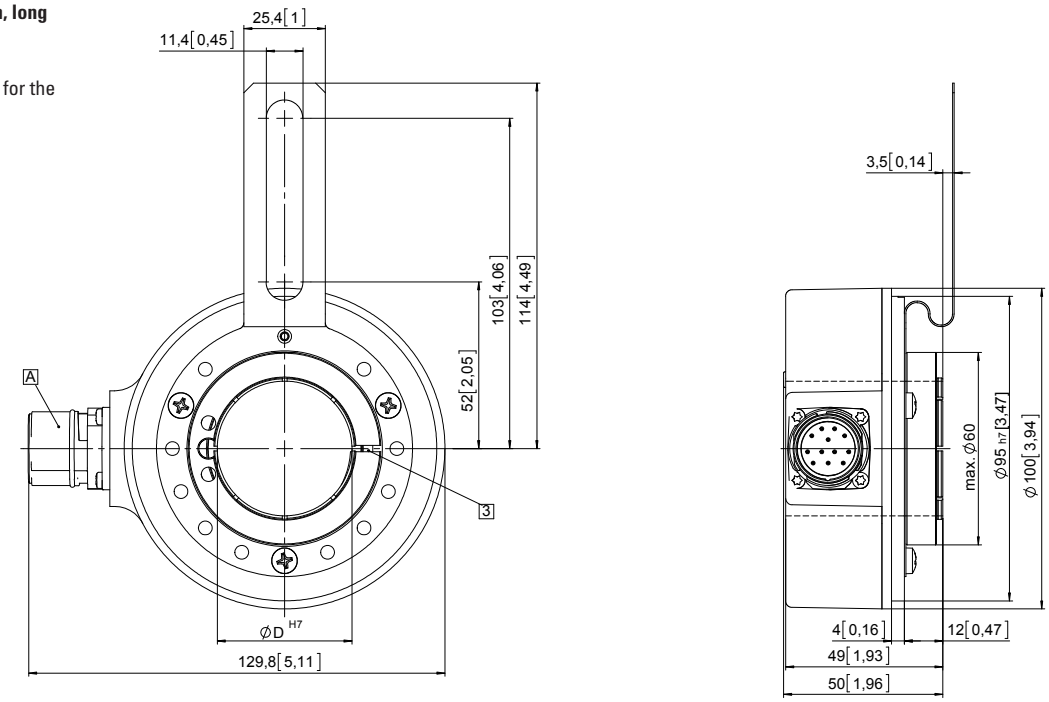
Dimensions hollow shaft version

Dimensions in mm [inch]

Flange with fastening arm, long
Flange type 5

3 Recommended torque for the clamping ring 2.0 Nm

A Plug version



Flange with fastening arm, short 4.5"
Flange type 6

3 Recommended torque for the clamping ring 2.0 Nm

A Plug version