

Incremental encoders

**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.



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, Sub-D or MIL connectors.
- With push-pull, RS422 or SinCos interface.

Order code Hollow shaft

8.A02H.XXXXX.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 torque stop, long
- 6 = with torque stop, short, 4.5" ¹⁾

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"]
- H = ø 35 mm [1.38"]
- 2 = ø 38 mm [1.50"]
- B = ø 40 mm [1.57"]
- 1 = ø 42 mm [1.65"]
- 4 = ø 1"

D = ø 1/2" ¹⁾

E = ø 5/8" ¹⁾

F = ø 3/4" ¹⁾

G = ø 1 1/8" ¹⁾

N = ø 1 1/4" ¹⁾

c Output circuit (with inverted signal) / power supply

- 1 = RS422 / 5 V DC
- 4 = RS422 / 10 ... 30 V DC
- 5 = Push-pull / 5 ... 30 V DC
- 3 = Push-pull / 10 ... 30 V DC
- 8 = SinCos, 1 Vpp / 5 V DC
- 9 = SinCos, 1 Vpp / 10 ... 30 V DC
- A = Push-pull (7272 compatible) / 5 ... 30 V DC

D = RS422 / 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
- E = radial M12 connector, 8-pin
- G = Sub-D connector, male contact, 9-pin, double-row ²⁾
- R = radial M12 connector, 5-pin ⁴⁾

K = MIL connector, 7-pin ¹⁾⁴⁾

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 ³⁾

1) US version.

2) Protection level IP40.

3) For the cable connection type, cable material PUR.

4) Without inversion, cannot be combined with SinCos.

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Mounting accessory for hollow shaft encoders

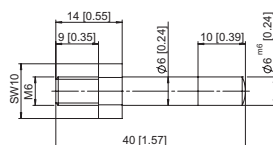
Dimensions in mm [inch]

Order no.

Cylindrical pin, long

for flange with spring element
(flange type 2 + 3)

with fixing thread



8,0010,4700,0003

Tether arm, flexible



70 mm [2.76"]

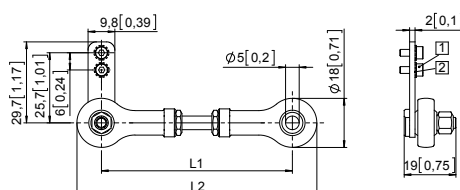
100 mm [3.94"]

150 mm [5.91"]

8.0010.40\$0.0000

8.0010.40T0.0000

8.0010.40U0.0000



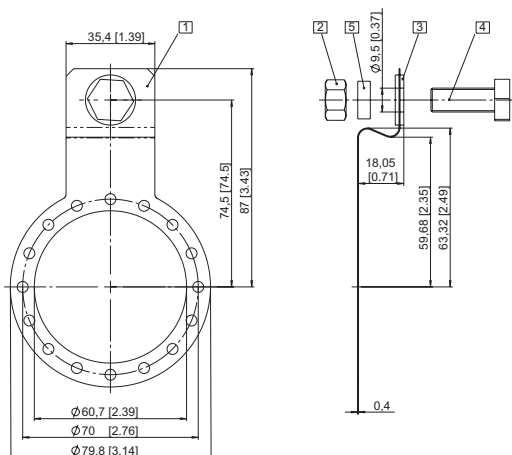
Tether arm	L1	L2
70 mm [2.76"]	64 ... 74 [2.51 ... 2.91]	82 ... 92 [3.23 ... 3.62]
100 mm [3.94"]	94 ... 104 [3.70 ... 4.09]	112 ... 122 [4.41 ... 4.80]
150 mm [5.91"]	144 ... 154 [5.67 ... 6.06]	162 ... 172 [6.38 ... 6.77]

- 1 Socket screw M2.5 x 6 [0.24]
2 Lock washer

Torque stop, short

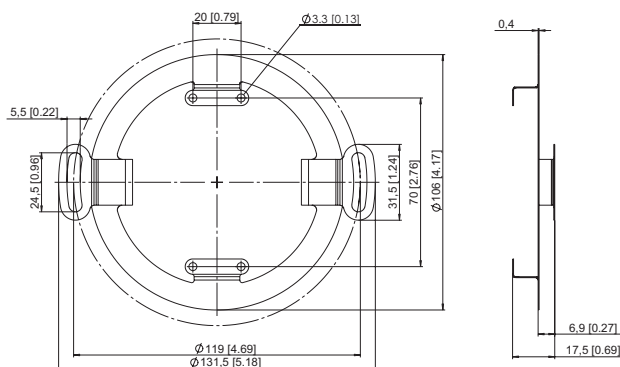


8.0010.4T00.0000



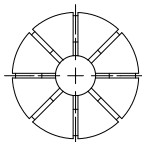
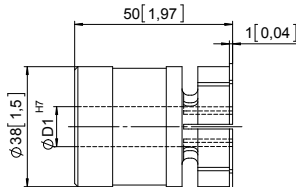
- 1 Curved spring element
- 2 Hexagonal nut 3/8 - 16 UNC
- 3 Washer (isolating)
- 4 Hexagonal screw 3/8 16 UNC x 1"
- 5 Washer D10.4 x 15 x 15

Stator coupling



8.0010.40V0.0000

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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 • Torque stop (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]   			ø D1: <table><tr><td>12 mm [0.47"]</td><td>8.0010.4091.0000</td></tr><tr><td>14 mm [0.55"]</td><td>8.0010.4027.0000</td></tr><tr><td>15 mm [0.59"]</td><td>8.0010.4038.0000</td></tr><tr><td>16 mm [0.63"]</td><td>8.0010.4019.0000</td></tr><tr><td>18 mm [0.71"]</td><td>8.0010.4080.0000</td></tr><tr><td>20 mm [0.79"]</td><td>8.0010.4011.0000</td></tr><tr><td>25 mm [0.98"]</td><td>8.0010.4012.0000</td></tr><tr><td>30 mm [1.18"]</td><td>8.0010.4016.0000</td></tr><tr><td>32 mm [1.26"]</td><td>8.0010.4015.0000</td></tr><tr><td>1/2"</td><td>8.0010.4013.0000</td></tr><tr><td>5/8"</td><td>8.0010.4070.0000</td></tr><tr><td>3/4"</td><td>8.0010.4090.0000</td></tr><tr><td>1"</td><td>8.0010.4050.0000</td></tr><tr><td>1 1/4"</td><td>8.0010.4060.0000</td></tr></table>	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	
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Isolation inserts prevent currents from passing through the encoder bearings. These currents can occur when using inverter controlled three-phase or AC vector motors and considerably shorten the service life of the encoder bearings. For more details please call our technical hotline (+49 7720 3903 952) or send us an email (info@kuebler.com)																																
Isolation insert for hollow shaft, ø 42 mm [1.65"]			external diameter 42 mm [1.65"] / internal diameter 38 mm [1.50"] external diameter 42 mm [1.65"] / internal diameter 12 mm [0.47"]	8.0010.4017.0000 8.0010.4029.0000																												

Additional connectors can be found in the connection technology section or in the connection technology area of our website at: kuebler.com/connection_technology.

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Large hollow shaft robust, optical		A02H (hollow shaft)	Push-pull / RS422 / SinCos
Connection technology			Order no.
Cordset, pre-assembled	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
Connector, self-assembly	M12 female connector with coupling nut, 8-pin, A coded, straight (metal)		05.CMB 8181-0
	M12 female connector with coupling nut, 8-pin, A coded, straight (stainless steel V4A)		8.0000.5136.0000.V4A
	M23 female connector with coupling nut, 12-pin, cw (metal)		8.0000.5012.0000

Additional connectors can be found in the connection technology section or in the connection technology area of our website at: kuebler.com/connection_technology.

Technical data			
Mechanical characteristics			
Maximum speed	at 60°C [140°F]	6000 min ⁻¹ ¹⁾ 2500 min ⁻¹ ¹⁾	
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 axial	200 N 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 (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 power supply		no	yes
UL approval		file no. E224618	
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
Power supply		5 V DC (±5 %) 5 ... 30 V DC 10 ... 30 V DC	5 ... 30 V DC 10 ... 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
Permissible load / channel		max. +/- 20 mA	max. +/- 30 mA
Pulse frequency		max. 300 kHz	max. 300 kHz
Signal level	HIGH LOW	min. 2.5 V max. 0.5 V	min. +V - 3 V max. 2.5 V
Rising edge time t _r		max. 200 ns	max. 1 µs
Falling edge time t _f		max. 200 ns	max. 1 µs
Short circuit proof outputs ⁴⁾		yes	yes
Reverse polarity protection of the power supply		no, 10 ... 30 V DC: yes	yes
UL approval		file no. E224618	
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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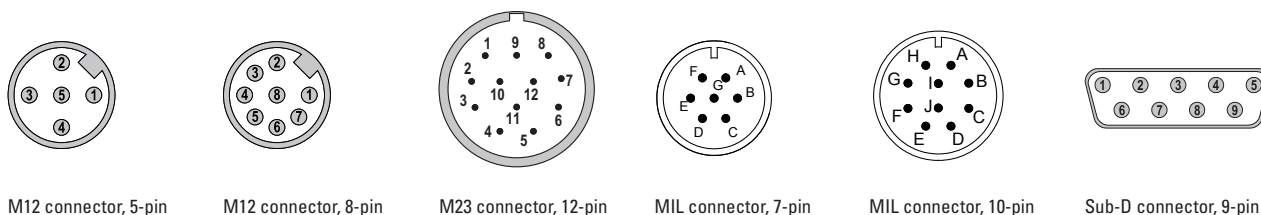
Push-pull / RS422 / SinCos

Terminal assignment

Output circuit	Type of connection	Cable (isolate unused cores individually before initial start-up)											
1 ... D	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 ... D	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 ¹⁾
Output circuit	Type of connection	M12 connector, 8-pin											
1 ... D	E	Signal:	0 V	+V	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	$\perp$		
		Pin:	1	2	3	4	5	6	7	8	PH ¹⁾		
Output circuit	Type of connection	M12 connector, 5-pin											
1 ... D	R	Signal:	0 V	+V	A	B	0	$\perp$					
		Pin:	1	2	3	4	5	PH ¹⁾					
Output circuit	Type of connection	MIL connector, 10-pin											
1 ... D	D	Signal:	0 V	+V	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	$\perp$		
		Pin:	F	D	A	G	B	H	C	I	J		
Output circuit	Type of connection	MIL connector, 7-pin											
1 ... D	K	Signal:	0 V	+V	+Vsens	A	B	0	$\perp$				
		Pin:	F	D	E	A	B	C	J				
Output circuit	Type of connection	Sub-D connector, 9-pin											
1 ... D	G	Signal:	0 V	+V	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	$\perp$		
		Pin:	1	2	3	6	4	7	5	8	PH ¹⁾		

+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



1) PH = shield is attached to connector housing.

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Push-pull / RS422 / SinCos

Dimensions hollow shaft version

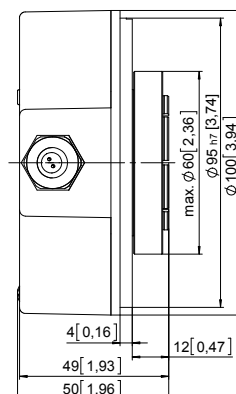
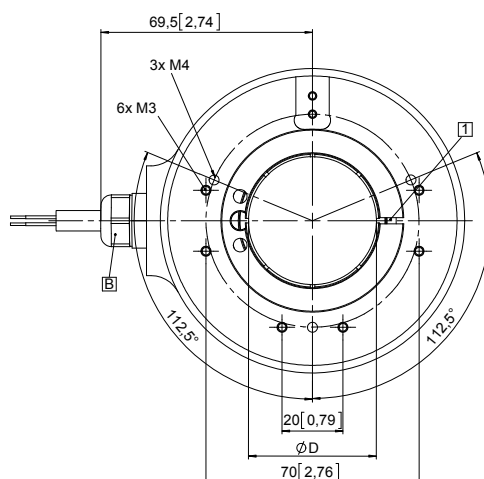
Dimensions in mm [inch]

Flange without mounting aid

Flange type 1

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

D	Fit
20 [0.79]	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
5/8"	H7
1"	H7
1 1/4"	H7

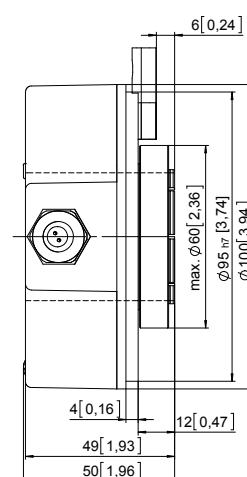
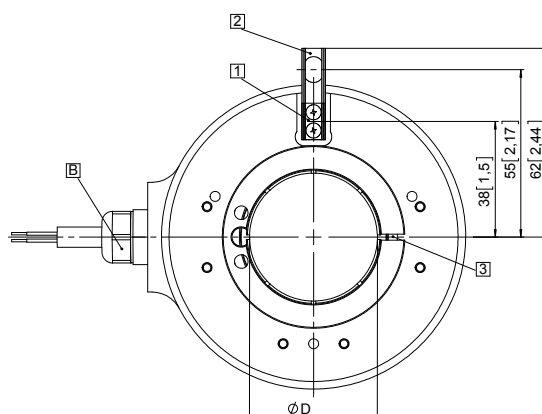


Flange with spring element

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

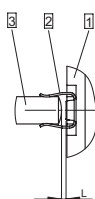
D	Fit
20 [0.79]	H7
25 [0.98]	H7
28 [1.10]	H7
30 [1.18]	H7
38 [1.50]	H7
40 [1.57]	H7
42 [1.65]	H7
5/8"	H7
1"	H7
1 1/4"	H7



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!

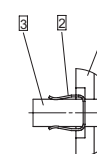
- 1 Flange
- 2 Spring element, short
- 3 Cylindrical pin



Mounting using the spring element, long

Cylindrical pin fed through the bore of the spring

- 1 Flange
- 2 Spring element, long
- 3 Cylindrical pin



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Dimensions hollow shaft version

Dimensions in mm [inch]

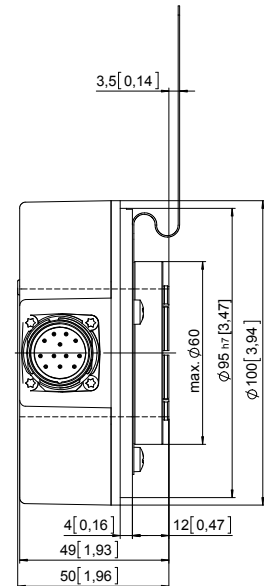
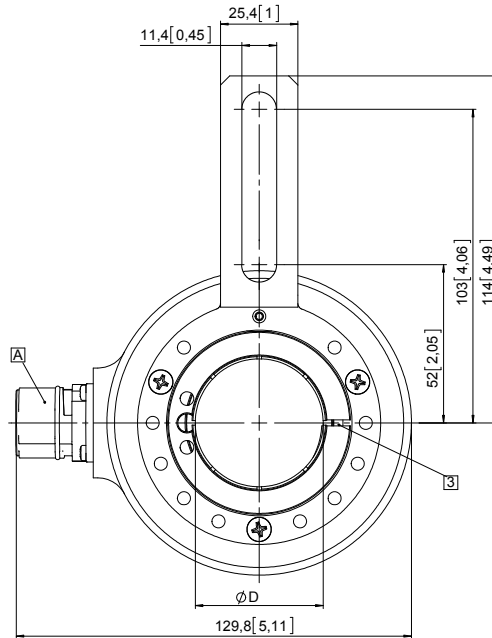
Flange with torque stop, long

Flange type 5

③ Recommended torque for the
clamping ring 2.0 Nm

Ⓐ Plug version

D	Fit
20 [0.79]	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
5/8"	H7
1"	H7
1 1/4"	H7



Flange with torque stop, short 4.5"

Flange type 6

③ Recommended torque for the
clamping ring 2.0 Nm

Ⓐ Plug version

D	Fit
20 [0.79]	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
5/8"	H7
1"	H7
1 1/4"	H7

