

# Incremental Encoders

<b>Large hollow shaft, optical</b>	<b>A02H (Hollow shaft) / Heavy Duty</b>	<b>Push-Pull / RS422 / SinCos</b>
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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.



Incremental Encoders

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, M23 or M12 connectors
- With Push-Pull, RS422 or SinCos interface

### Order code Hollow shaft version

<b>8.A02H</b>	<b>.XXXXX</b>	<b>.XXXX</b>
Type	a b c d	e

#### a Flange

- 1 = without mounting aid
- 2 = with short spring element
- 3 = with long spring element
- 5 = with fastening arm long

#### b Hollow shaft

- 1 = ø 42 mm
- 2 = ø 38 mm
- 3 = ø 28 mm
- 4 = ø 25.4 mm (1")
- 5 = ø 25 mm
- 6 = ø 24 mm
- 7 = ø 32 mm
- A = ø 30 mm
- B = ø 40 mm
- C = ø 20 mm
- H = ø 35 mm
- M = ø 19 mm

#### c Output circuit / Power supply

- 1 = RS422 (with inverted signal) / 5 V DC
- 2 = Push-pull (without inverted signal) / 10 ... 30 V DC
- 3 = Push-pull (with inverted signal) / 10 ... 30 V DC
- 4 = RS422 (with inverted signal) / 10 ... 30 V DC
- 5 = Push-pull (with inverted signal) / 5 ... 30 V DC
- 8 = SinCos, 1 Vss (with inverted signal) / 5 V DC
- 9 = SinCos, 1 Vss (with inverted signal) / 10 .. 30 V DC
- A = Push-pull 7272 compatible / 5 ... 30 V DC

#### d Type of connection

- 1 = radial cable (1 m PVC cable)
- 2 = M23 connector, 12-pin, radial, without mating connector
- E = M12 connector, 8-pin, radial

#### e Pulse rate

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

SinCos version not available with pulses <1024

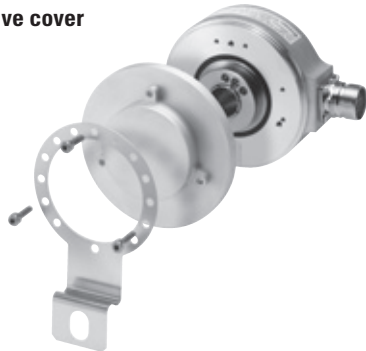
optional on request  
- Ex 2/22  
- special cable length



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### 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

**8.0010.40Y0.0001**

Scope of delivery:

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

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### Tapered shaft mounting kit for A02H with hollow shaft $\varnothing$ 38 mm



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.

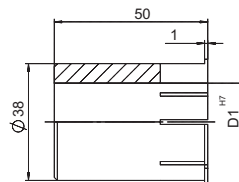
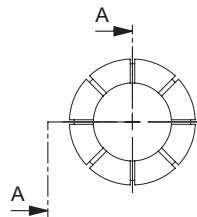
Included in the set:

- Insert for cone blind hole, cone 1:10, 17 mm length
- Isolation insert
- Allen screw for central fixing

**8.0010.4028.0000**

## Mounting accessory for hollow shaft encoders

### Isolation insert for hollow shaft $\varnothing$ 38 mm (Temperature range -40 ... +115°C)



ø D1:	Order-no:
12 mm	<b>8.0010.4091.0000</b>
12.7 mm (1/2")	<b>8.0010.4013.0000</b>
14 mm	<b>8.0010.4027.0000</b>
15.875 mm	<b>8.0010.4070.0000</b>
16 mm	<b>8.0010.4019.0000</b>
18 mm	<b>8.0010.4080.0000</b>
19.05 mm (3/4")	<b>8.0010.4090.0000</b>
20 mm	<b>8.0010.4011.0000</b>
25 mm	<b>8.0010.4012.0000</b>
25.4 mm	<b>8.0010.4050.0000</b>
31.75 mm (1 1/4")	<b>8.0010.4060.0000</b>

Isolation inserts prevent currents from passing through the encoder bearings. These currents can occur when using inverter controlled three-phase or AC motor 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)

<b>Isolation insert for hollow shaft <math>\varnothing</math> 42 mm</b>	External diameter 42 mm / Internal diameter 38 mm	<b>8.0010.4017.0000</b>
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## Connection Technology

Connector, self-assembly	M12 M23	05.CMB-8181-0 8.0000.5012.0000
<b>Cordset, pre-assembled with 2 m PVC cable</b>	M12 M23	<b>05.00.6041.8211.002M 8.0000.6201.0002</b>

Further accessories can be found in the Accessories section or in the Accessories area of our website at: [www.kuebler.com/accessories](http://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](http://www.kuebler.com/connection_technology).

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## A02H (Hollow shaft) / Heavy Duty

## Push-Pull / RS422 / SinCos

Mechanical characteristics	
<b>Speed</b>	max. 6000 min <sup>-1</sup> 1) max. 2500 min <sup>-1</sup> 1) at 60°C
<b>Rotor moment of inertia</b>	< 220 x 10 <sup>-6</sup> kgm <sup>2</sup> 2)
<b>Starting torque with sealing</b>	< 0.2 Nm
<b>Weight</b>	approx. 0.8 kg
<b>Protection acc. to EN 60 529</b>	IP65
<b>EX approval for hazardous areas</b>	optional Zone 2 and 22
<b>Working temperature range</b>	-40°C 3) ... +80°C
<b>Materials</b>	shaft stainless steel, bore tolerance H7
<b>Shock resistance acc. EN 60068-2-27</b>	1000 m/s <sup>2</sup> , 6 ms
<b>Vibration resistance acc. EN 60068-2-6</b>	100 m/s <sup>2</sup> , 10...2000 Hz

Electrical characteristics SinCos output		
Output circuit	SinCos U = 1 Vss	SinCos U = 1 Vss
<b>Power supply</b>	5 V ±5%	10 ... 30 V DC
<b>Power consumption with inverted signal (no load)</b>	typ. 65 mA/max. 110 mA	typ. 65 mA/max. 110 mA
<b>-3 dB frequency</b>	< 180 kHz	< 180 kHz
<b>Signal level</b>		
channels A/B	1 Vss (±20%)	1 Vss (±20%)
channel 0:	0.1 ... 1.2 V	0.1 ... 1.2 V
<b>Short circuit proof outputs 4)</b>	yes	yes
<b>Reverse polarity protection of the power supply</b>	no	yes
<b>UL approval</b>	File 224618	
<b>GL approval</b>	Letter of Conformity No. 74130	
<b>CE compliant acc. to</b>	EN 61 000-6-2, EN 61 000-6-4 and EN 61 000-6-3	
<b>RoHS compliant acc. to</b>	EU guideline 2002/95/EG	

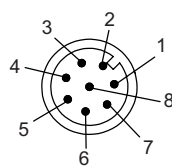
Electrical characteristics RS422 / Push-Pull				
Output circuit	RS422 (TTL compatible)	Push-Pull	Push-Pull (7272 compatible)	
<b>Power supply</b>	5 V (±5 %) o. 10 ... 30 V DC	10 ... 30 V DC	5 ... 30 V DC	
<b>Power consumption (no load)</b>				
without inverted signal	–	typ. 55 mA/max. 125 mA	–	
with inverted signal	typ. 40 mA/max. 90 mA	typ. 80 mA/max. 150 mA	typ. 50 mA/max. 100 mA	
<b>Permissible load / channel</b>	max. ±20 mA	max. ±30 mA	max. ±20 mA	
<b>Pulse frequency</b>	max. 300 kHz	max. 300 kHz	max. 300 kHz 5)	
<b>Signal level</b>	high min. 2.5 V low max. 0.5 V	min. U <sub>B</sub> – 3 V max. 2.5 V	min. U <sub>B</sub> – 2.0 V max. 0.5 V	
<b>Rising edge time t<sub>r</sub></b>	max. 200 ns	max. 1 μs	max. 1 μs	
<b>Falling edge time t<sub>f</sub></b>	max. 200 ns	max. 1 μs	max. 1 μs	
<b>Short circuit proof outputs 4)</b>	yes	yes	yes	
<b>Reverse polarity protection of the power supply</b>	no, 10 ... 30 V: yes	yes	no	
<b>UL approval</b>	File 224618			
<b>GL approval</b>	Letter of Conformity No. 74130			
<b>CE compliant acc. to</b>	EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3			
<b>CE compliant acc. to</b>	EU guideline 2002/95/EG			

### Terminal assignment

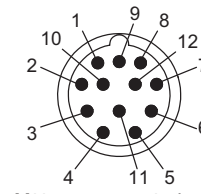
Output circuit	Type of connection	Cable
1 ... A	1	Signal: 0 V +V 0 Vsens +Vsens A $\bar{A}$ B $\bar{B}$ 0 $\bar{0}$ $\frac{\perp}{\perp}$
		Kabelfarbe: WH BN GY PK RD BU GN YE GY PK BU RD shield
Output circuit	Type of connection	M23 connector, 12-pin
1 ... A	2	Signal: 0 V +V 0 Vsens +Vsens A $\bar{A}$ B $\bar{B}$ 0 $\bar{0}$ $\frac{\perp}{\perp}$
		Pin: 10 12 11 2 5 6 8 1 3 4 PH 6)
Output circuit	Type of connection	M12 connector eurofast, 8-pin
1 ... A	E	Signal: 0 V +V 0 Vsens +Vsens A $\bar{A}$ B $\bar{B}$ 0 $\bar{0}$ $\frac{\perp}{\perp}$
		Pin: 1 2 3 4 5 6 7 8 PH 6)

Isolate unused outputs before initial start-up.

### Top view of mating side, male contact base



M12 connector, 8-pin



M23 connector, 12-pin

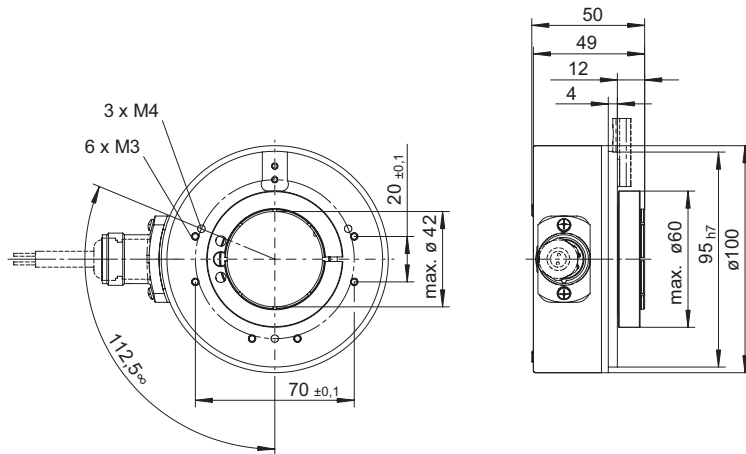
- 1) During the run-in-phase of approx. 2 hours, reduce the limits for working temperature<sub>max</sub> or speed max by 1/3.
- 2) Depending on shaft diameter
- 3) With connector: -40°C, securely installed: -30°C, flexibly installed: -20°C
- 4) If supply voltage correctly applied.
- 5) Max. recommended cable length 30 m
- 6) PH = Shield is attached to connector housing

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## Dimensions hollow shaft version

Without mounting aid  
Flange type 1

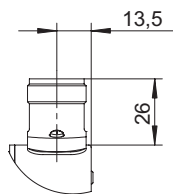


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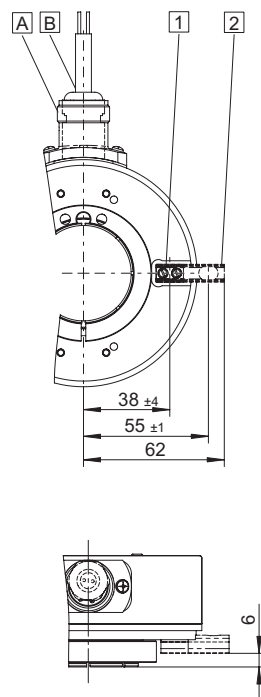
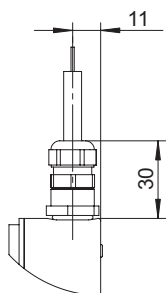
### With spring element

- 1 Spring element short (flange type 2)
- 2 Spring element long (flange type 3)

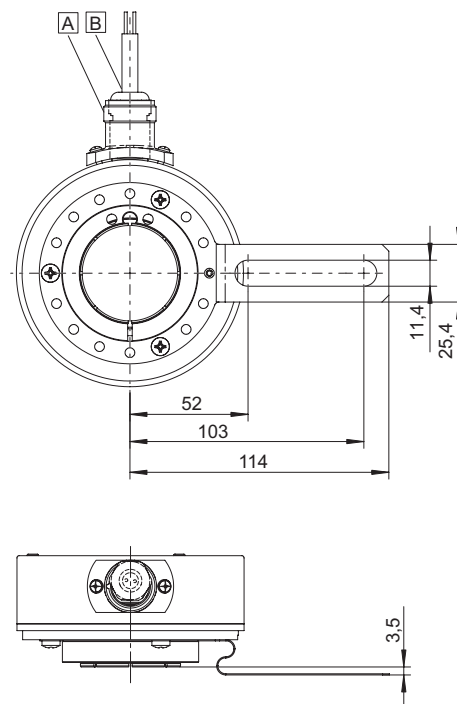
A Plug version



B Cable version

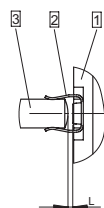


### With fastening arm long Flange type 5



### Mounting using the spring element - short

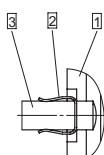
When mounting the encoder, ensure that dim. L is larger than the maximum axial play of the drive in the direction of the arrow.



- 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