

Incremental Encoders

Large hollow shaft, optical	A02H (Hollow shaft) / Heavy Duty	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.



Incremental Encoders

High rotational speed	High IP value	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 Shaft / Hollow shaft version

8.A02H	.XXXXX.	XXXX
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 / 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

Incremental Encoders

Large hollow shaft, optical

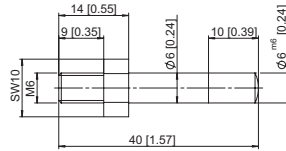
A02H (Hollow shaft) / Heavy Duty

Push-Pull / RS422 / SinCos

Mounting accessory for hollow shaft encoders

Cylindrical pin long

for torque stops



With fixing thread

8.0010.4700.0003

Tether arm large, flexible



Length L

70 mm

100 mm

150 mm

L1

70 [2.76]

100 [3.94]

150 [5.91]

L2

88 [3.46]

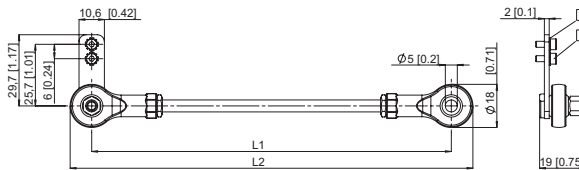
118 [4.65]

168 [6.61]

8.0010.40S0.0000

8.0010.40T0.0000

8.0010.40U0.0000



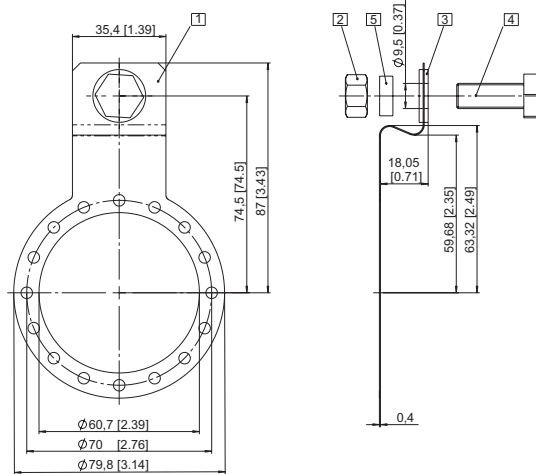
1 Socket screw M2.5 x 6

2 Lock washer

Fastening arm, short



8.0010.4T00.0000



1 Curved spring element

2 Hexagonal nut 3/8 - 16 UNC

3 Washer (isolating)

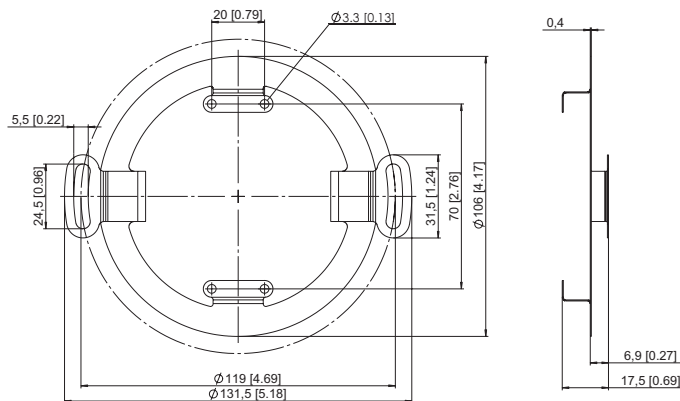
4 Hexagonal screw 3/8 16 UNC x 1"

5 Washer D10.4 x 15 x 15

Stator coupling



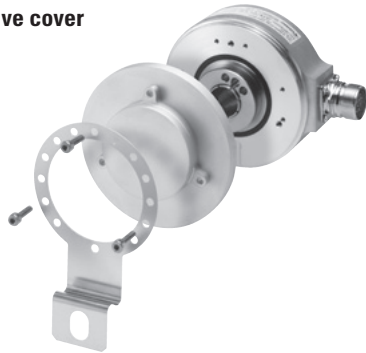
8.0010.40V0.0000



Incremental Encoders

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

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

Incremental Encoders

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.

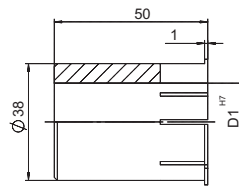
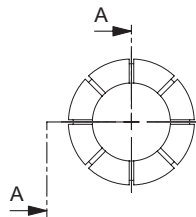
Included in the set:

- 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)



\varnothing D1:
12 mm
12.7 mm (1/2")
14 mm
15.875 mm
16 mm
18 mm
19.05 mm (3/4")
20 mm
25 mm
25.4 mm
31.75 mm (1 1/4")

Order-no:
8.0010.4091.0000
8.0010.4013.0000
8.0010.4027.0000
8.0010.4070.0000
8.0010.4019.0000
8.0010.4080.0000
8.0010.4090.0000
8.0010.4011.0000
8.0010.4012.0000
8.0010.4050.0000
8.0010.4060.0000

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)

Isolation insert for hollow shaft \varnothing 42 mm

External diameter 42 mm / Internal diameter 38 H7

8.0010.4017.0000

Connection Technology

Connector, self-assembly

M12	05.CMB-8181-0
M23	8.0000.5012.0000

Cordset, pre-assembled with 2 m PVC cable

M12	05.WAKS8-2/P00
M23	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.

Incremental Encoders

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

Mechanical characteristics		
Speed	at 70°C at 80°C	max. 6000 min ⁻¹ 1) max. 3500 min ⁻¹ 1)
Rotor moment of inertia		< 220 x 10 ⁻⁶ kgm ² 2)
Starting torque with sealing		< 0.2 Nm
Weight		approx. 0.8 kg
Protection acc. to EN 60 529		IP65
EX approval for hazardous areas		optional Zone 2 and 22
Working temperature range		-40°C 3) ... +80°C
Materials	shaft	stainless steel, bore tolerance H7
Shock resistance acc. EN 60068-2-27		1000 m/s ² , 6 ms
Vibration resistance acc. EN 60068-2-6		100 m/s ² , 10...2000 Hz

Electrical characteristics SinCos output		
Output circuit	SinCos U = 1 Vss	SinCos U = 1 Vss
Power supply	5 V ±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 Vss (±20%)	1 Vss (±20 %)
channel 0:	0.1 ... 1.2 V	0.1 ... 1.2 V
Short circuit proof outputs 4)	yes	yes
Reverse connection of the supply voltage	no	yes
UL certified	File 224618	
CE compliant acc. to	EN 61 000-6-2, EN 61 000-6-4 and EN 61 000-6-3	
RoHS compliant acc. to	EU guideline 2002/95/EG	

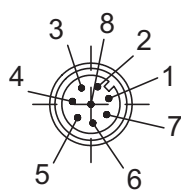
Electrical characteristics				
Output circuit		RS422 (TTL-compatible)	Push-Pull	Push-Pull (7272)
Power supply		5 V (±5 %) o. 10 ... 30 V DC	10 ... 30 V DC	5 ... 30 V DC
Power consumption (no load)				
	without inverted signal	–	typ. 55 mA/max. 125 mA	–
	with inverted signal	typ. 40 mA/max. 90 mA	typ. 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 low	min. 2.5 V max. 0.5 V	min. U _B - 3 V max. 2.5 V	min. U _B - 2.0 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 connection of the supply voltage		no, 10 ... 30 V: yes	yes	no
UL certified		File 224618		
CE compliant acc. to		EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3		
CE compliant acc. to		EU guideline 2002/95/EG		

Terminal assignment

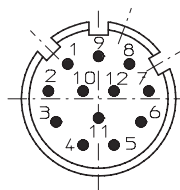
Signal:	0 V GND	+U _B	0 V Sensor	+U _B Sensor	A	\bar{A}	B	\bar{B}	Z	\bar{Z}	shield
M23 connector, multifastr, 12-pin, Pin	10	12	11	2	5	6	8	1	3	4	PH 6)
M12 connector, eurofast, 8-pin, Pin	1	2			3	4	5	6	7	8	PH 6)
Cable colour	WH	BN	GY PK	RD BU	GN	YE	GY	PK	BU	RD	shield

Isolate unused outputs before initial start-up.

Top view of mating side, male contact base



8-pin M12 connector



12-pin M23 connector

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, securely installed: -30°C, flexibly installed: -20°C

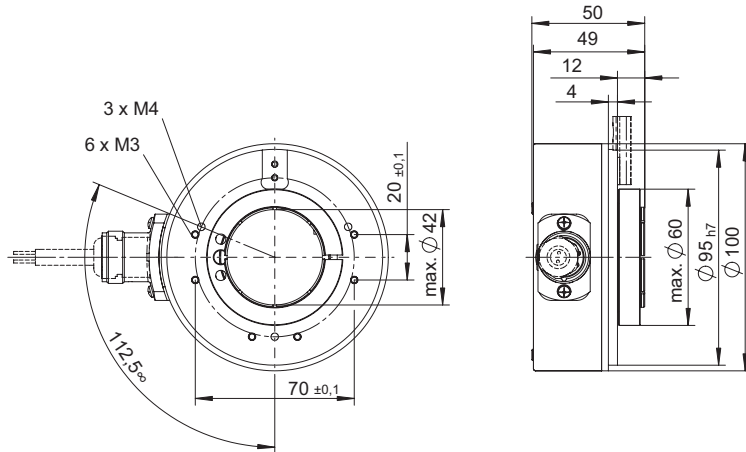
4) If supply voltage correctly applied.
 5) Max. recommended cable length 30 m
 6) PH = Shield is attached to connector housing

Incremental Encoders

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

Dimensions hollow shaft version

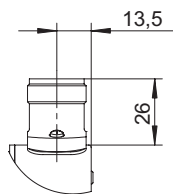
Without mounting aid
Flange type 1



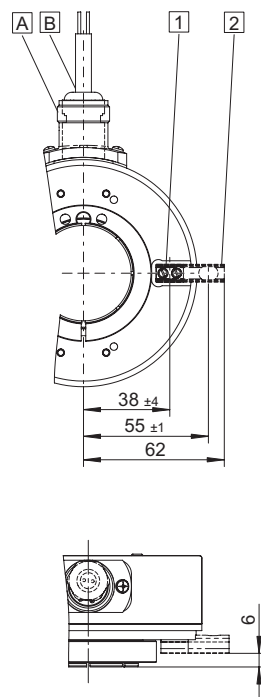
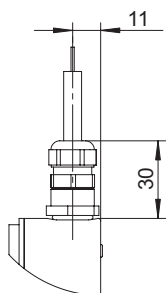
With spring element

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

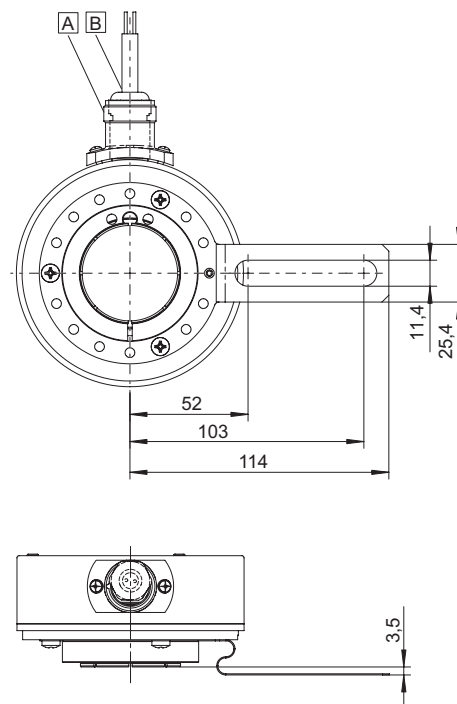
A Plug version



B Cable version

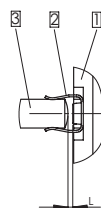


With fastening arm long Flange type 5



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