

## GBA2H

 Through hollow shaft up to  $\varnothing 14$  mm / SSI

Optical singleturn encoders up to 19 bit

### Overview

- High resolution encoder singleturn / SSI
- Optical sensing method
- Resolution: max. 19 bit
- Through hollow shaft up to  $\varnothing 14$  mm
- High reliability by self-diagnostics
- Counting direction input
- Electronic setting of zero point
- Available with additional incremental output



### Technical data

#### Technical data - electrical ratings

Voltage supply	10...30 VDC
Reverse polarity protection	Yes
Consumption w/o load	$\leq 50$ mA (24 VDC)
Initializing time typ.	20 ms after power on
Interface	SSI Incremental A 90° B (optional)
Function	Singleturn
Steps per revolution	$\leq 524288$ / 19 bit
Absolute accuracy	$\pm 0,01^\circ$
Sensing method	Optical
Code	Gray or binary
Code sequence	CW/CCW coded by connection
Inputs	SSI clock Control signals UP/DOWN inv. and zero
Output stages	SSI data: linedriver RS485 Diagnostic and incremental outputs
Incremental output	2048 pulses A90°B + inverted
Interference immunity	EN 61000-6-2
Emitted interference	EN 61000-6-4
Diagnostic function	Self-diagnosis
Approval	UL approval / E63076

#### Technical data - mechanical design

Size (flange)	$\varnothing 58$ mm
Shaft type	$\varnothing 10...14$ mm (through hollow shaft)
Protection EN 60529	IP 54 IP 65 (optional)
Operating speed	$\leq 6000$ rpm (mechanical) $\leq 6000$ rpm (electric)
Starting torque	$\leq 0,04$ Nm (+25 °C, IP 54)
Rotor moment of inertia	20 gcm <sup>2</sup>
Material	Housing: aluminium Flange: aluminium
Operating temperature	-25...+85 °C -40...+85 °C (optional)
Relative humidity	95 % non-condensing
Resistance	EN 60068-2-6 Vibration $\pm 0.75$ mm - 10-58 Hz 10 g - 58-2000 Hz EN 60068-2-27 Shock 200 g, 6 ms
Weight approx.	400 g
Connection	Connector M23, 12-pin Cable 1 m

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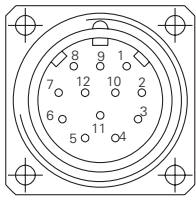
## Terminal assignment

### GBA2H

Connector	Core colour	Assignment
Pin 1	brown	UB
Pin 2	black	GND
Pin 3	blue	Clock+
Pin 4	beige	Data+
Pin 5	green	Zero setting
Pin 6	yellow	Data-
Pin 7	violet	Clock-
Pin 8	brown/yellow	UBminOK inv.
Pin 9	pink	UP/DOWN inv.
Pin 10-12	-	-

### GBA2H with incremental tracks | SinCos

Connector	Core colour	Assignment Incremental	SinCos
Pin 1	brown	UB	UB
Pin 2	white	GND	GND
Pin 3	blue	Clock+	Clock+
Pin 4	green	Data+	Data+
Pin 5	grey	Zero setting	Zero setting
Pin 6	yellow	Data-	Data-
Pin 7	red	Clock-	Clock-
Pin 8	red/blue	Track B inv.	Cosine inv.
Pin 9	pink	UP/DOWN inv.	UP/DOWN inv.
Pin 10	violet	Track A inv.	Sine inv.
Pin 11	black	Track A	Sine
Pin 12	grey/pink	Track B	Cosine



Please use cores twisted in pairs (for example clock+ / clock-) for extension cables of more than 10 m length.

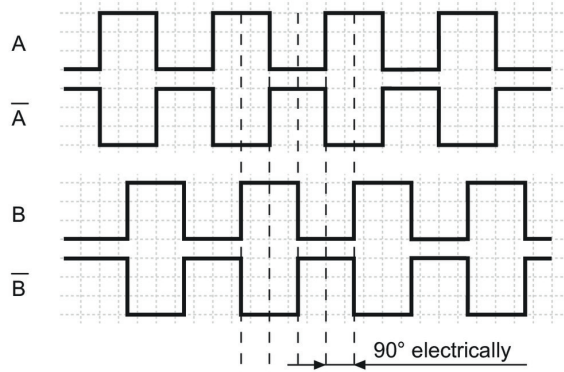
## Terminal significance

UB	Encoder voltage supply.
GND	Encoder ground connection relating to UB.
Data+/Data-	Differential SSI data output.
Clock+/Clock-	Differential SSI clock input. Optocoupler or RS422 input.
Zero setting	Input for setting a zero point anywhere within the encoder resolution. The zero setting operation is triggered by a High impulse and has to be in line with the selected direction of rotation (UP/DOWN inv.). Connect to GND after setting operation for maximum interference immunity. Impulse duration $\geq 100$ ms.
UBminOK inv.	Diagnostic output. Level low indicates the operating voltage has dropped below the minimum limit.
UP/DOWN inv.	UP/DOWN inv. counting direction input. This input is standard on High. UP/DOWN inv. means ascending output data with clockwise shaft rotation when looking at flange. UP/DOWN inv.-Low means ascending values with counterclockwise shaft rotation when looking at flange.
Incremental Outputs	Incremental tracks A 90° B and inverted.

## Output signals

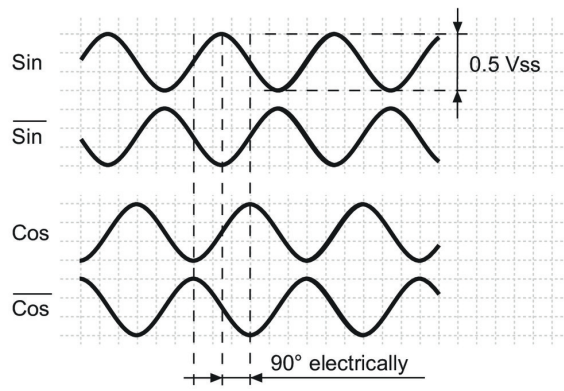
### Push-pull and RS422

A leading B when rotating the shaft clockwise and looking at flange.



### SinCos

Sin leading Cos when rotating the shaft clockwise and looking at flange.



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### Trigger level

SSI	Circuit
SSI-Clock	Optocoupler with switching current approx. 7 mA or RS422 with terminating resistor
SSI-Data	Linedriver RS485 or RS422

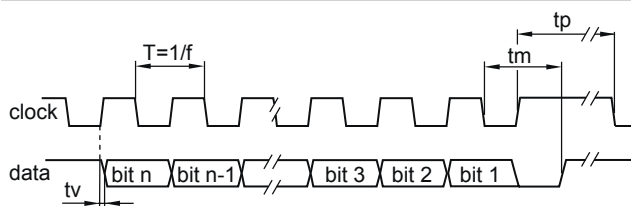
Control inputs	Input circuit
Input level High	$>0.7 U_B$
Input level Low	$<0.3 U_B$
Input resistance	10 k $\Omega$

Diagnostic outputs or Incremental outputs	Output circuit Push-pull circuit-proof
Output level High	$>U_B - 3.5$ V (I = -20 mA)
Output level Low	$<0.5$ V (I = 20 mA)
Load High / Low	$<20$ mA

Incremental outputs	Linedriver RS422
Output level High	$>2.5$ V (I = -20 mA)
Output level Low	$<0.5$ V (I = 20 mA)
Load High / Low	$<20$ mA

Outputs	SinCos
Output level	0.5 V <sub>pp</sub> $\pm 10$ % (Output signals before difference formation)
Load	$<10$ mA

### Data transfer



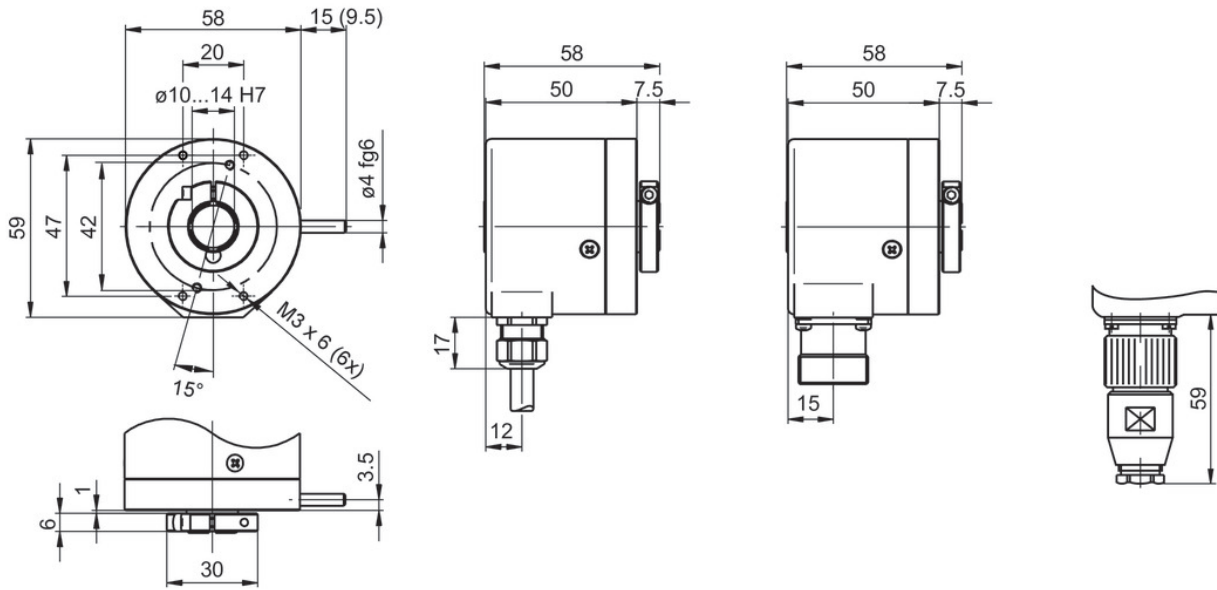
Clock frequency f	62.5...1500 kHz
Duty cycle of T	40...60 %
Delay time tv	150 ns
Monoflop time tm	26 $\mu$ s + T/2
Clock interval tp	30 $\mu$ s

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## Dimensions



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## Ordering reference

Product	GBA2H.	#	###	##	##
<b>Through hollow shaft</b>					
ø10 mm, without pin, IP 54	GBA2H.	8			
ø10 mm, pin 15 mm, IP 54		9			
ø12 mm, without pin, IP 54		0			
ø12 mm, pin 15 mm, IP 54		1			
ø12 mm, pin 9.5 mm, IP 54		B			
ø14 mm, without pin, IP 54		4			
ø14 mm, without pin, IP 65		6			
ø14 mm, pin 15 mm, IP 54		5			
ø14 mm, pin 9.5 mm, IP 54		F			
<b>Voltage supply / Signals</b>					
10...30 VDC, Gray code 18 bit					10
5 VDC, Gray code 18 bit					11
10...30 VDC, binary code 18 bit					12
5 VDC, binary code 18 bit					13
10...30 VDC, Gray code 17 bit					20
5 VDC, Gray code 17 bit					21
10...30 VDC, binary code 17 bit					22
5 VDC, binary code 17 bit					23
10...30 VDC, Gray code 19 bit					30
10...30 VDC, binary code 19 bit					32
<b>Connection</b>					
Cable radial, 1 m					21
Cable radial, 1 m, for incremental output					81
Flange socket M23, radial, 12-pin, male contacts, CW					A1
Flange socket M23, radial, 12-pin, male contacts, CW for incremental output					A5
<b>Pulses / Incremental output</b>					
Without incremental output					05
2048 pulses, push-pull					14
2048 pulses, RS422					16

## Accessories

### Mounting accessories

11003562	Spring coupling for encoders with ø58 mm housing, hole distance 63 mm (Z 119.082)
11034121	Spring coupling for encoders with ø58 mm housing, hole distance 68 mm (Z 119.073)
10165157	Spring coupling for encoders with ø58 mm housing, hole distance 73 mm (Z 119.072)
11066120	Mounting kit 056
11034106	Spring coupling for motor's fan guard (Z 119.053)
11034123	Spring coupling for one-side attachment, length 115 mm (Z 119.076)
11098229	Clamping ring set 16/30x6 - stainless steel (Z 119.092)

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#### Connectors and cables

11034154	Female connector M23, 12-pin, without cable (Z 130.001)
11034156	Female connector M23, 12-pin, 3 m cable (Z 130.004)
10126594	Female connector M23, 12-pin, 5 m cable (Z 130.005)
10129757	Female connector M23, 12-pin, 10 m cable (Z 130.007)
11042991	Female connector M23, 12-pin, 15 m cable (Z 130.M15)
11034344	Female connector M23, 12-pin, without cable (incr.) (Z 182.001)
11034345	Female connector M23, 12-pin, 2 m (incr.) (Z 182.003)
11034346	Female connector M23, 12-pin, 5 m (incr.) (Z 182.005)
11076757	Female connector M23, 12-pin, 8 m (incr.) (Z 182.M08)
11034347	Female connector M23, 12-pin, 10 m (incr.) (Z 182.007)
11051323	Female connector M23, 12-pin, 15 m (incr.) (Z 182.M15)