

Absolute encoders - SSI

Through hollow shaft up to $\varnothing 14$ mm

Optical singleturn encoders up to 19 bit

GBA2H



GBA2H with through hollow shaft

Features

- 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 - electrical ratings

Voltage supply	10...30 VDC
Reverse polarity protection	Yes
Consumption w/o load	≤ 50 mA (24 VDC)
Initializing time typ.	20 ms after power on
Interfaces	SSI, Incremental A 90° B (optional)
Function	Singleturn
Steps per revolution	≤ 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	DIN EN 61000-6-2
Emitted interference	DIN 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 DIN EN 60529	IP 54, IP 65 (optional)
Operating speed	≤ 6000 rpm (mechanical) ≤ 6000 rpm (electric)
Starting torque	≤ 0.04 Nm (+25 °C, IP 54)
Rotor moment of inertia	20 gcm ²
Materials	Housing: aluminium Flange: aluminium
Operating temperature	-25...+85 °C -40...+85 °C (optional)
Relative humidity	95 % non-condensing
Resistance	DIN EN 60068-2-6 Vibration ± 0.75 mm - 10-58 Hz 10 g - 58-2000 Hz DIN 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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Part number

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Pulses / Incremental output

- 05 No incremental output
- 14 2048 pulses / push-pull
- 16 2048 pulses / RS422
- 17 2048 periods / SinCos*

Connection

- A1 Connector M23, 12-pin, radial
- A5 Connector M23, 12-pin, radial, for incremental output 14/16/17
- 21 Cable 1 m, radial
- 81 Cable 1 m, radial, for incremental output 14/16/17

Voltage supply / signals

- 10 10...30 VDC / gray code 18 bit
- 11 5 VDC / gray code 18 bit
- 12 10...30 VDC / binary code 18 bit
- 13 5 VDC / binary code 18 bit
- 20 10...30 VDC / gray code 17 bit
- 21 5 VDC / gray code 17 bit
- 22 10...30 VDC / binary code 17 bit
- 23 5 VDC / binary code 17 bit
- 30 10...30 VDC / gray code 19 bit
- 32 10...30 VDC / binary code 19 bit

Through hollow shaft

- 8 $\varnothing 10$ mm, without pin / IP 54
- 9 $\varnothing 10$ mm, pin 15 mm / IP 54
- 0 $\varnothing 12$ mm, without pin / IP 54
- 1 $\varnothing 12$ mm, pin 15 mm / IP 54
- B $\varnothing 12$ mm, pin 9.5 mm / IP 54
- 4 $\varnothing 14$ mm, without pin / IP 54
- 6 $\varnothing 14$ mm, without pin / IP 65
- 5 $\varnothing 14$ mm, pin 15 mm / IP 54
- F $\varnothing 14$ mm, pin 9.5 mm / IP 54

* On request

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Accessories

Connectors and cables

11034154	Female connector M23, 12-pin, without cable (Z 130.001)
10138559	Female connector M23, 12-pin, 2 m cable (Z 130.003)
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)

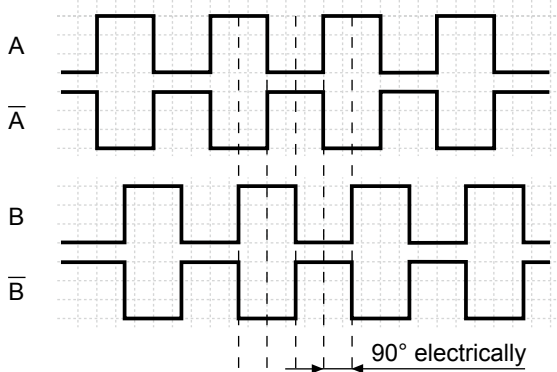
Mounting accessories

11003562	Spring coupling for encoders with $\varnothing 58$ mm housing, hole distance 63 mm (Z 119.082)
11034121	Spring coupling for encoders with $\varnothing 58$ mm housing, hole distance 68 mm (Z 119.073)
10165157	Spring coupling for encoders with $\varnothing 58$ mm housing, hole distance 73 mm (Z 119.072)
10147837	Spring coupling for one-side attachment, length 35 mm (Z 119.050)
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)

Output signals

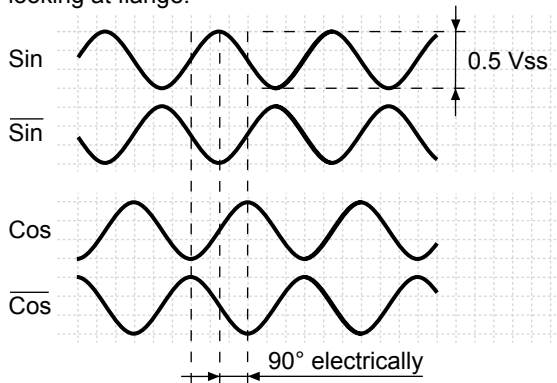
Push-pull and RS422

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

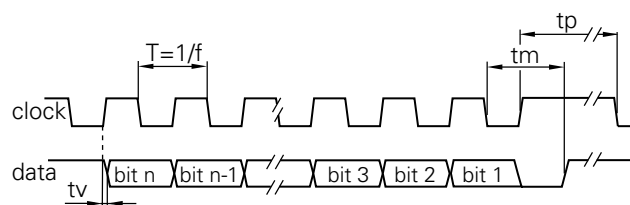


SinCos

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



Data transfer



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

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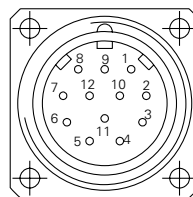
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Terminal significance	
UB	Encoder voltage supply.
GND	Encoder ground connection relating to UB.
Data+	Positive, serial data output of differential linedriver.
Data-	Negative, serial data output of differential linedriver.
Clock+	Positive SSI clock input. Clock+ together with clock- forms a current loop. A current of approx. 7 mA towards clock+ input means logic 1 in positive logic.
Clock-	Negative SSI clock input. Clock- together with clock+ forms a current loop. A current of approx. 7 mA towards clock- input means logic 0 in positive logic.
Zero setting	Input for setting a zero point anywhere within the programmed 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). Connect to GND after setting operation for maximum interference immunity. Impulse duration >100 ms.
$\overline{\text{UBminOK}}$	Diagnostic output. Level low indicates the operating voltage has dropped below the minimum limit.
$\overline{\text{UP/DOWN}}$	$\overline{\text{UP/DOWN}}$ counting direction input. This input is standard on High. $\overline{\text{UP/DOWN}}$ means ascending output data with clockwise shaft rotation when looking at flange. $\overline{\text{UP/DOWN}}$ -Low means ascending values with counterclockwise shaft rotation when looking at flange.
Incremental Outputs	Incremental tracks A 90° B and inverted.

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	$\overline{\text{UBminOK}}$
Pin 9	pink	$\overline{\text{UP/DOWN}}$
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.	$\overline{\text{Cosine}}$
Pin 9	pink	$\overline{\text{UP/DOWN}}$	$\overline{\text{UP/DOWN}}$
Pin 10	violet	Track A inv.	$\overline{\text{Sine}}$
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.

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Trigger level

SSI	Circuit	Incremental outputs	Linedriver RS422
SSI-Clock	Optocoupler	Output level High	>2.5 V (I = -20 mA)
SSI-Data	Linedriver RS485	Output level Low	<0.5 V (I = 20 mA)
		Load High / Low	<20 mA
Control inputs	Input circuit	Outputs	SinCos
Input level High	>0.7 UB	Output level	0.5 V _{pp} ± 10 % (Output signals before difference formation)
Input level Low	<0.3 UB	Load	<10 mA
Input resistance	10 k Ω		
Incremental outputs	Output circuit Push-pull circuit-proof	Diagnostic output	
Output level High	$>UB - 3.5$ V (I = -20 mA)	NPN-Open Collector – 10 k Ω to UB internally connected	
Output level Low	<0.5 V (I = 20 mA)	Output level Low	≤ 0.5 V (I = 20 mA)
Load High / Low	<20 mA	Load Low	≤ 40 mA

Dimensions

