

Absolute encoders - SSI

Blind hollow shaft up to $\varnothing 15$ mm

Optical singleturn encoders up to 19 bit

GBA2S



GBA2S with blind hollow shaft

Features

- High resolution encoder singleturn / SSI
- Optical sensing method
- Resolution: max. 19 bit
- Blind hollow shaft $\varnothing 12... \varnothing 15$ mm
- Electronic setting of zero point
- Counting direction input
- Suitable for high positive, negative accelerations
- Available with additional incremental output

Technical data - electrical ratings

Voltage supply	10...30 VDC 5 VDC ± 10 %
Reverse polarity protection	Yes
Consumption w/o load	≤ 50 mA (24 VDC) ≤ 80 mA (5 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	$\varnothing 12...15$ mm (blind hollow shaft)
Protection DIN EN 60529	IP 54, IP 65 (optional)
Operating speed	≤ 6000 rpm (mechanical) ≤ 6000 rpm (electric)
Starting torque	≤ 0.015 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 100 g, 6 ms
Weight approx.	250 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
- 11 Cable 1 m, axial
- 21 Cable 1 m, radial
- 71 Cable 1 m, axial, for incremental output 14/16/17
- 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

Blind hollow shaft

- 0 $\varnothing 12$ mm, without pin
- 1 $\varnothing 12$ mm, pin 15 mm
- B $\varnothing 12$ mm, pin 9.5 mm
- 4 $\varnothing 14$ mm, without pin
- 5 $\varnothing 14$ mm, pin 15 mm
- F $\varnothing 14$ mm, pin 9.5 mm
- U $\varnothing 15$ mm, pin 15 mm / IP 54
- W $\varnothing 15$ mm, without pin / IP 65

* 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)

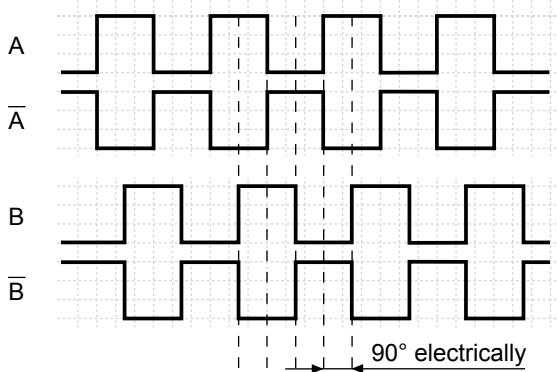
Mounting accessories

10140347	Torque support and spring washer for encoders with 9.5 mm pin (Z 119.024)
10139345	Torque support by rubber buffer for encoders with 15 mm pin (Z 119.041)
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

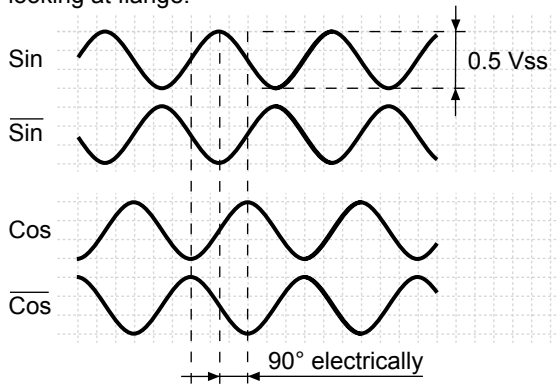
Push-pull and RS422

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

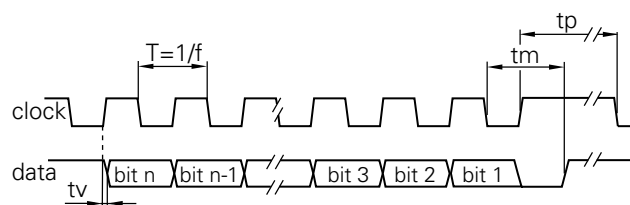


SinCos

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 μ s + T/2
Clock interval t_p	30 μ s

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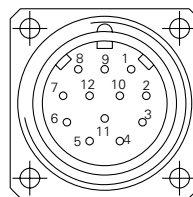
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Terminal significance	
UB	Encoder voltage supply.
GND	Encoder ground connection relating to UB.
Data+	Positive, serial data output of differential linedriver.
Data-	Negative, serial data output of differential linedriver.
Clock+	Positive SSI clock 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		
GBA2S		
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	–	–

GBA2S 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 Vpp ± 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

