

Absolute encoders - SSI

Blind hollow shaft up to $\varnothing 15$ mm

Optical singleturn encoders up to 18 bit

GBA2S



GBA2S with blind hollow shaft

Features

- High resolution encoder singleturn / SSI
- Optical sensing method
- Resolution: max. 18 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 |
| 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 turn | ≤ 262144 / 18 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: steel Flange: aluminium |
| Operating temperature | -25...+85 °C -40...+85 °C (optional) |
| Relative humidity | 95 % non-condensing |
| Resistance | DIN EN 60068-2-6 Vibration 10 g, 16-2000 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

GBA2S.

| | | | |
|--|--|--|--|
| | | | |
|--|--|--|--|

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
- 12 10...30 VDC / binary code 18 bit
- 20 10...30 VDC / gray code 17 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

Accessories

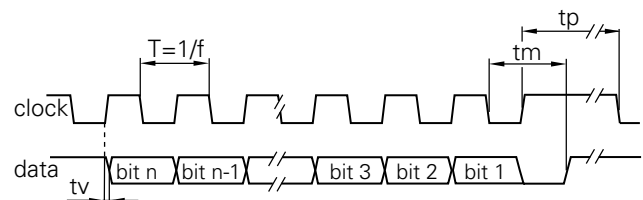
Connectors and cables

| | |
|----------|---|
| 11034154 | Female connector M23, 12-pin, without cable (Z 130.001) |
| 10138559 | Female connector M23, 12-pin, 2 m cable (Z 130.003) |
| 10126594 | Female connector M23, 12-pin, 5 m cable (Z 130.005) |
| 10129757 | Female connector M23, 12-pin, 10 m cable (Z 130.007) |
| 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) |

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) |

Data transfer



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

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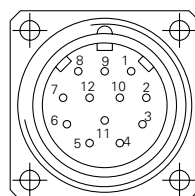
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| Terminal significance | |
|-----------------------------|--|
| UB | Encoder voltage supply. |
| GND | Encoder ground connection relating to UB. |
| Data+ | Positive, serial data output of differential linedriver. |
| Data- | Negative, serial data 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 | 1 Vpp ± 10 % |
| 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

