

GA241 - SSI

Solid shaft with synchro flange

Optical singleturn encoders 14 bit

Overview

- Encoder singleturn / SSI
- Optical sensing method
- Resolution: 14 bit
- Synchro flange
- Electronic setting of zero point
- Available with additional incremental output



Technical data

Technical data - electrical ratings

| | |
|-----------------------------|--|
| Voltage supply | 10...30 VDC 5 VDC $\pm 10\%$ (on request) |
| Reverse polarity protection | Yes (10...30 VDC) / No (5 VDC) |
| Consumption w/o load | ≤ 50 mA (24 VDC) |
| Initializing time typ. | 20 ms after power on |
| Interface | SSI Incremental A 90° B (optional) |
| Function | Singleturn |
| Steps per revolution | ≤ 16384 / 14 bit |
| Absolute accuracy | $\pm 0.025^\circ$ |
| 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 RS422 Diagnostic outputs push-pull Incremental: push-pull or linedriver RS422 |
| 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 | $\varnothing 6$ mm solid shaft |
| Flange | Synchro flange |
| Protection EN 60529 | IP 54 (without shaft seal) IP 65 (with shaft seal) |
| Operating speed | ≤ 10000 rpm (mechanical) ≤ 6000 rpm (electric) |
| Starting torque | ≤ 0.01 Nm (+25 °C, IP 54) ≤ 0.015 Nm (+25 °C, IP 65) |
| Rotor moment of inertia | 14.5 gcm ² |
| Admitted shaft load | ≤ 20 N axial ≤ 40 N radial |
| 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 ± 0.75 mm - 10-58 Hz 10 g - 58-2000 Hz EN 60068-2-27 Shock 200 g, 6 ms |
| Weight approx. | 250 g |
| Connection | Connector M23, 12-pin Connector M12, 8-pin Cable 1 m |

Optional

- Corrosion protection for offshore applications

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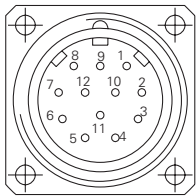
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Terminal assignment

Cable or connector M23

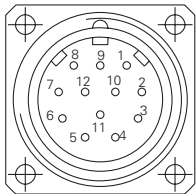
| Pin | Core colour | Assignment |
|-------|--------------|--------------|
| 1 | brown | UB |
| 2 | black | GND |
| 3 | blue | Clock+ |
| 4 | beige | Data+ |
| 5 | green | Zero setting |
| 6 | yellow | Data- |
| 7 | violet | Clock- |
| 8 | brown/yellow | UBminOK inv. |
| 9 | pink | UP/DOWN inv. |
| 10-12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



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

Cable or connector M23 with incremental tracks

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

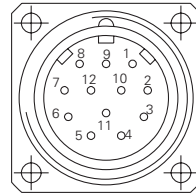


Please use cores twisted in pairs (for example clock+ / clock-) for extension cables of more than 10 m length.

Terminal assignment

Cable or connector M23 with SinCos

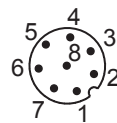
| Pin | Core colour | Assignment |
|-----|-------------|--------------|
| 1 | brown | UB |
| 2 | white | GND |
| 3 | blue | Clock+ |
| 4 | green | Data+ |
| 5 | grey | Zero setting |
| 6 | yellow | Data- |
| 7 | red | Clock- |
| 8 | red/blue | Cosine inv. |
| 9 | pink | UP/DOWN inv. |
| 10 | violet |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



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

Connector M12

| Pin | Assignment |
|-----|--------------|
| 1 | GND |
| 2 | UB |
| 3 | Clock+ |
| 4 | Clock- |
| 5 | Data+ |
| 6 | Data- |
| 7 | Zero setting |
| 8 | UP/DOWN inv. |



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

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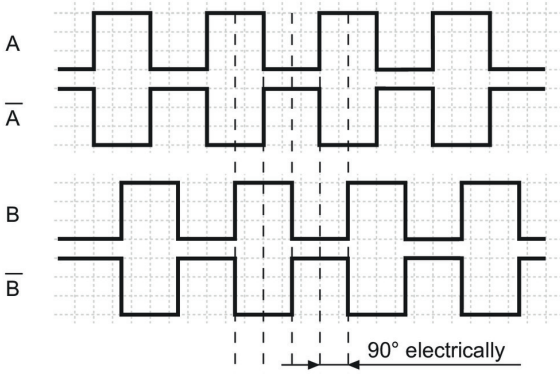
Terminal significance

| | |
|---------------------|--|
| 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 ≥ 100 ms. |
| UBminOK inv. | Diagnostic output. <9 V 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

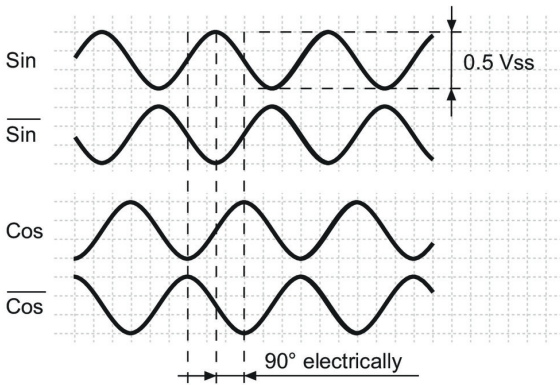
Push-pull and RS422

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.



Trigger level

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

Control inputs

| Control inputs | Input circuit |
|------------------|---------------|
| Input level High | >0.7 UB |
| Input level Low | <0.3 UB |
| Input resistance | 10 kΩ |

Diagnostic outputs or Incremental outputs

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

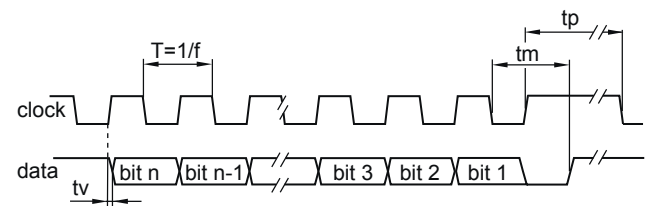
Incremental outputs

| 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

| Outputs | SinCos |
|--------------|---|
| Output level | 0.5 Vpp ± 10 % (Output signals before difference formation) |
| Load | <10 mA |

Data transfer

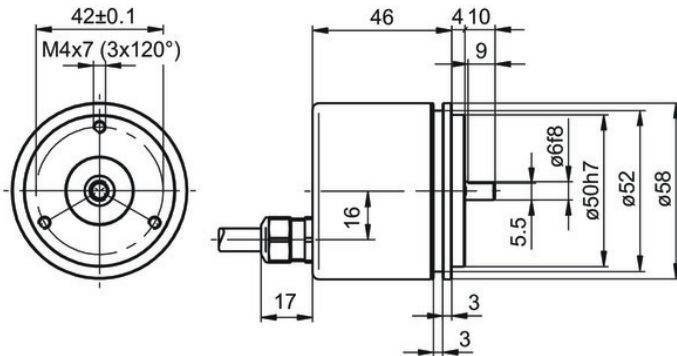


| | |
|-------------------|------------------|
| Clock frequency f | 62.5...1500 kHz |
| Duty cycle of T | 40...60 % |
| Delay time tv | 150 ns |
| Monoflop time tm | 26 μ s + T/2 |
| Clock interval tp | 30 μ s |

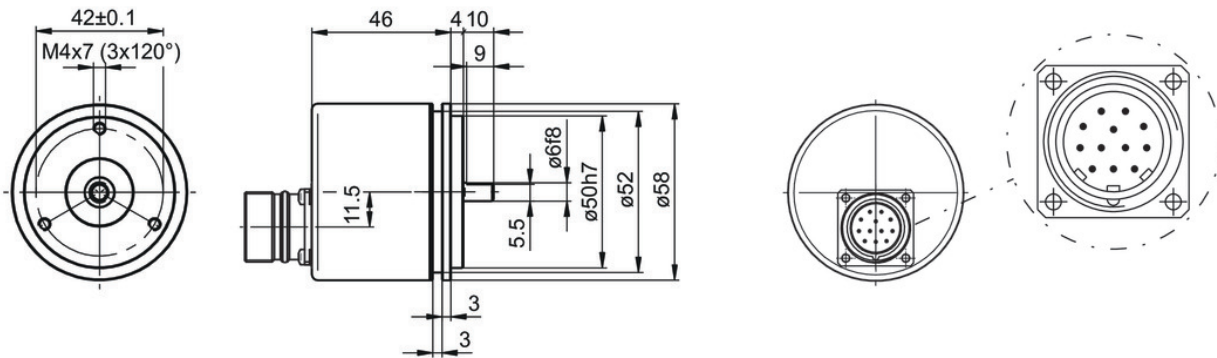
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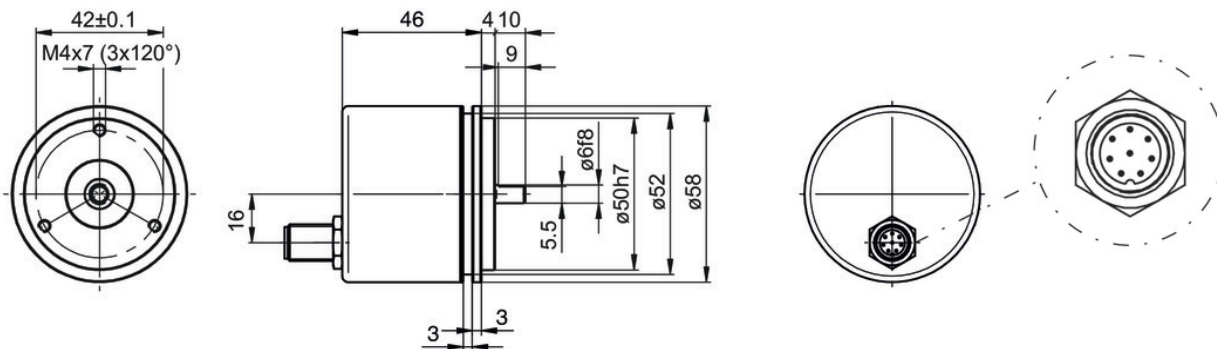
Dimensions



Cable, axial



Connector M23, axial

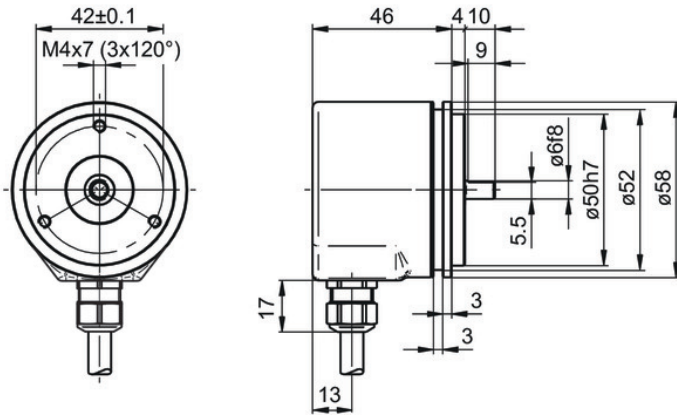


Connector M12, axial

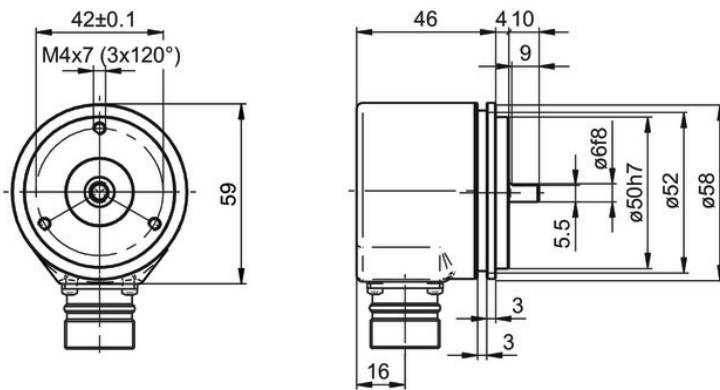
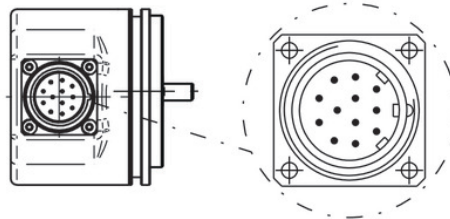
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Dimensions



Cable, radial

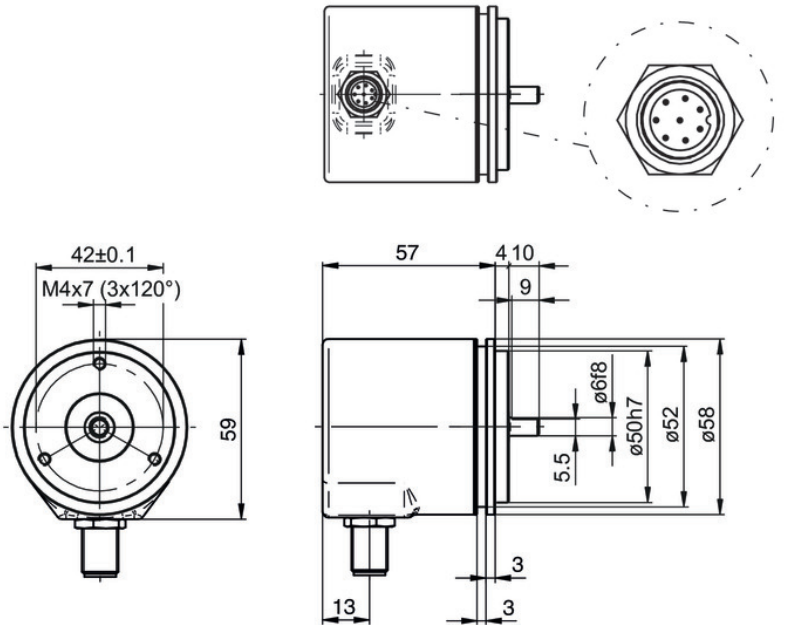


Connector M23, radial

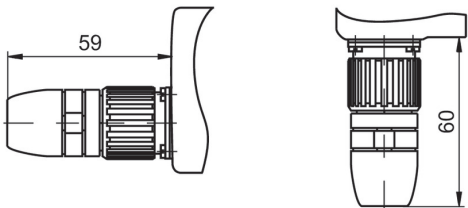
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Dimensions



Connector M12, radial



Connector dimensions M23

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Ordering reference

| | GA241. | # | ## | ## | ## |
|---|--------|---|----|----|----|
| Product | GA241. | | | | |
| Flange / Solid shaft | | | | | |
| Synchro flange, ø6 mm, IP 54 | | 1 | | | |
| Synchro flange, ø6 mm, IP 65 | | B | | | |
| Voltage supply / signals | | | | | |
| 10...30 VDC, Gray code, 13 bit | | | | 30 | |
| 10...30 VDC, binary code, 13 bit | | | | 32 | |
| 5 VDC, binary code, 13 bit | | | | 33 | |
| 10...30 VDC, Gray code, 12 bit | | | | 40 | |
| 10...30 VDC, Gray code, 14 bit | | | | 90 | |
| 5 VDC, Gray code, 14 bit | | | | 91 | |
| 10...30 VDC, binary code, 14 bit | | | | 92 | |
| Connection | | | | | |
| Cable axial, 1 m | | | | | 11 |
| Cable radial, 1 m | | | | | 21 |
| Cable axial, 1 m, for incremental output | | | | | 71 |
| Cable radial, 1 m, for incremental output | | | | | 81 |
| Flange socket M23, axial, 12-pin, male contacts, CW | | | | | A0 |
| Flange socket M23, radial, 12-pin, male contacts, CW | | | | | A1 |
| Flange socket M23, radial, 12-pin, male contacts, CW for incremental output | | | | | A5 |
| Flange socket M12, axial, 8-pin, male contacts, A-coded | | | | | M4 |
| Flange socket M12, radial, 8-pin, male contacts, A-coded | | | | | M5 |
| Pulses / Incremental output | | | | | |
| Without incremental output | | | | | 05 |
| 2048 pulses, push-pull | | | | | 14 |
| 2048 pulses, RS422 | | | | | 16 |

Accessories

Mounting accessories

| | |
|----------|---|
| 10117669 | Eccentric fixing, single (Z 119.006) |
| 10117667 | Mounting adaptor for encoders with synchro flange (Z 119.015) |
| 10158124 | Bearing flange for encoders with synchro flange (Z 119.035) |
| 10141132 | Spring washer coupling D1=6 / D2=10 (Z 121.C01) |