

Absolute encoders - SSI

Solid shaft with synchro flange

Optical singleturn encoders 14 bit

GA241 - SSI



GA241 with connector M23

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	\leq 50 mA (24 VDC)
Initializing time typ.	20 ms after power on
Interfaces	SSI, Incremental A 90° B (optional)
Function	Singleturn
Steps per revolution	\leq 16384 / 14 bit
Absolute accuracy	\pm 0.025 °
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	DIN EN 61000-6-2
Emitted interference	DIN EN 61000-6-4
Diagnostic function	Self-diagnosis
Approval	UL approval / E63076

Features

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

Optional

- Corrosion protection for offshore applications

Technical data - mechanical design

Size (flange)	\varnothing 58 mm
Shaft type	\varnothing 6 mm solid shaft
Flange	Synchro flange
Protection DIN EN 60529	IP 54 (without shaft seal), IP 65 (with shaft seal)
Operating speed	\leq 10000 rpm (mechanical) \leq 6000 rpm (electric)
Starting torque	\leq 0.01 Nm (+25 °C, IP 54) \leq 0.015 Nm (+25 °C, IP 65)
Rotor moment of inertia	14.5 gcm ²
Admitted shaft load	\leq 20 N axial \leq 40 N radial
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 \pm 0.75 mm - 10-58 Hz 10 g - 58-2000 Hz DIN 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

· Subject to modification in technic and design. Errors and omissions excepted.

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Part number

GA241.

Pulses / Incremental output

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

Connection

- A0 Connector M23, 12-pin, axial
- 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
- M4 Connector M12, 8-pin axial
- M5 Connector M12, 8-pin, radial

Voltage supply / signals

- 33 5 VDC / binary code 13 bit*
- 91 5 VDC / gray code 14 bit*
- 40 10...30 VDC / gray code 12 bit
- 30 10...30 VDC / gray code 13 bit
- 32 10...30 VDC / binary code 13 bit
- 90 10...30 VDC / gray code 14 bit
- 92 10...30 VDC / binary code 14 bit

Flange / Solid shaft

- 1 Synchro flange / ø6 mm, IP 54
- B Synchro flange / ø6 mm, 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)
10127844	Connection cable 2 m shielded with female connector M12, 8-pin, straight (ESG 34FH0200G)
10129333	Connection cable 10 m shielded with female connector M12, 8-pin, straight (ESG 34FH1000G)

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)

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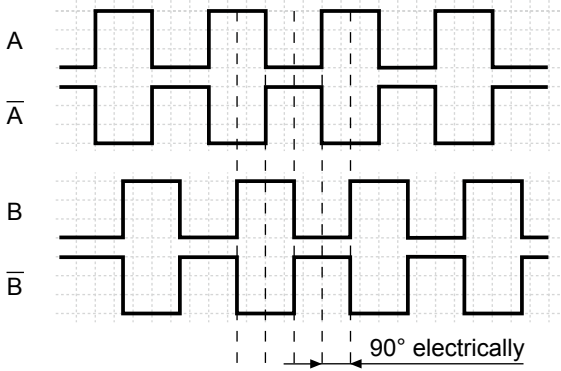
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Output signals

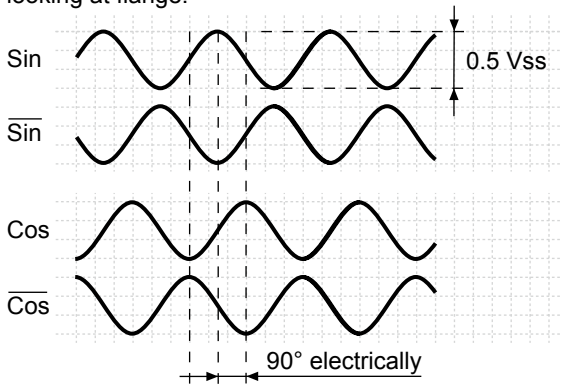
Push-pull and RS422

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

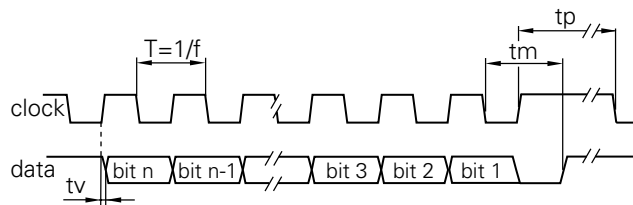


SinCos

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 tv	150 ns
Monoflop time tm	26 μs + T/2
Clock interval tp	30 μs

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 UB
Input level Low	<0.3 UB
Input resistance	10 kΩ

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	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 Vpp ±10 % (Output signals before difference formation)
Load	<10 mA

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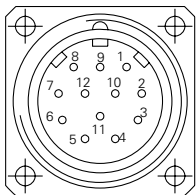
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Terminal assignment

Cable or connector M23

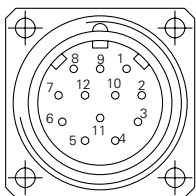
Pin	Core colour	Assignment
1	brown	UB
2	black	GND
3	blue	Clock+
4	beige	Data+
5	green	Zero setting
6	yellow	Data-
7	violet	Clock-
8	brown/yellow	UBminOK inv.
9	pink	UP/DOWN inv.
10-12	-	-



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

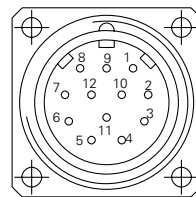
Pin	Core colour	Assignment
1	brown	UB
2	white	GND
3	blue	Clock+
4	green	Data+
5	grey	Zero setting
6	yellow	Data-
7	red	Clock-
8	red/blue	Track B inv.
9	pink	UP/DOWN inv.
10	violet	Track A inv.
11	black	Track A
12	grey/pink	Track B



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

Cable or connector M23 with SinCos

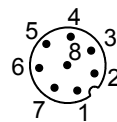
Pin	Core colour	Assignment
1	brown	UB
2	white	GND
3	blue	Clock+
4	green	Data+
5	grey	Zero setting
6	yellow	Data-
7	red	Clock-
8	red/blue	Cosine inv.
9	pink	UP/DOWN inv.
10	violet	Sine inv.
11	black	Sine
12	grey/pink	Cosine



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.



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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.

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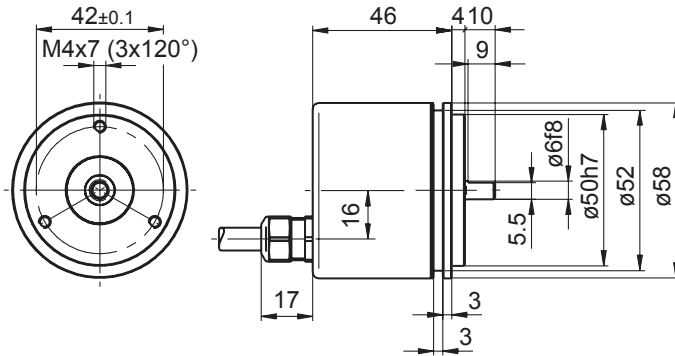
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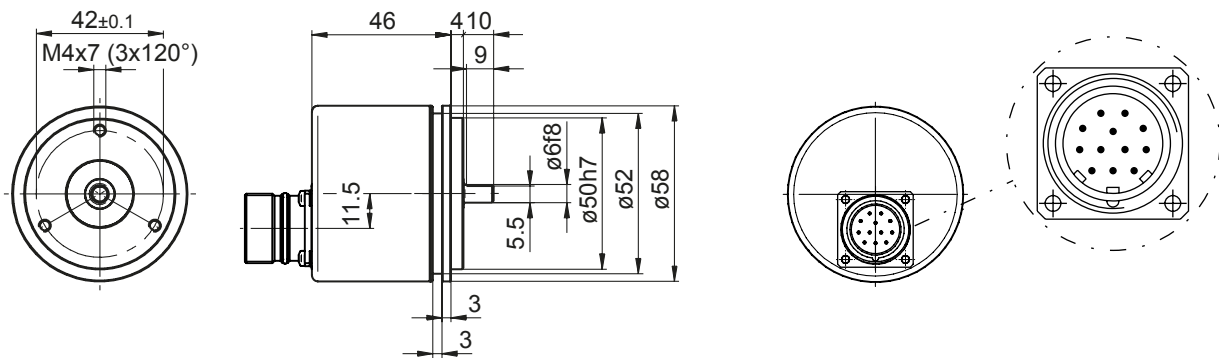
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Dimensions

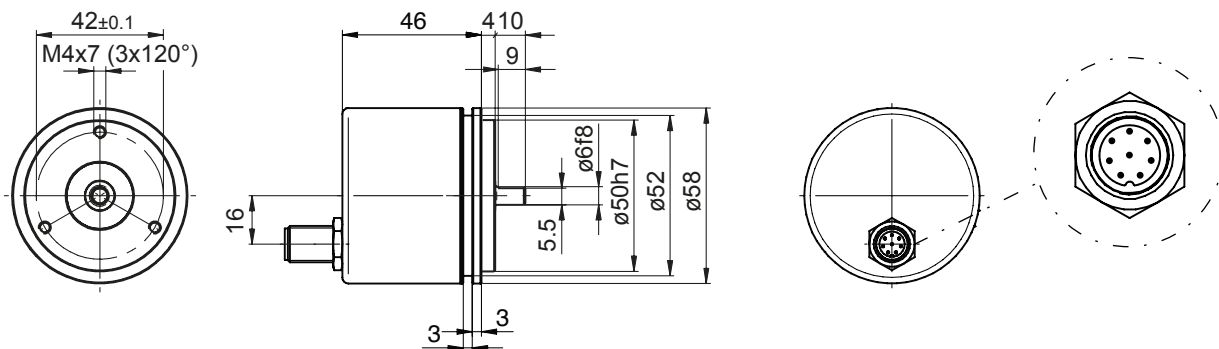
Cable, axial



Connector M23, axial



Connector M12, axial



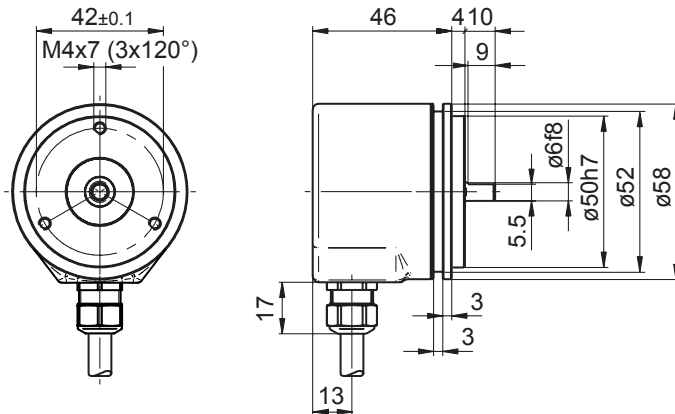
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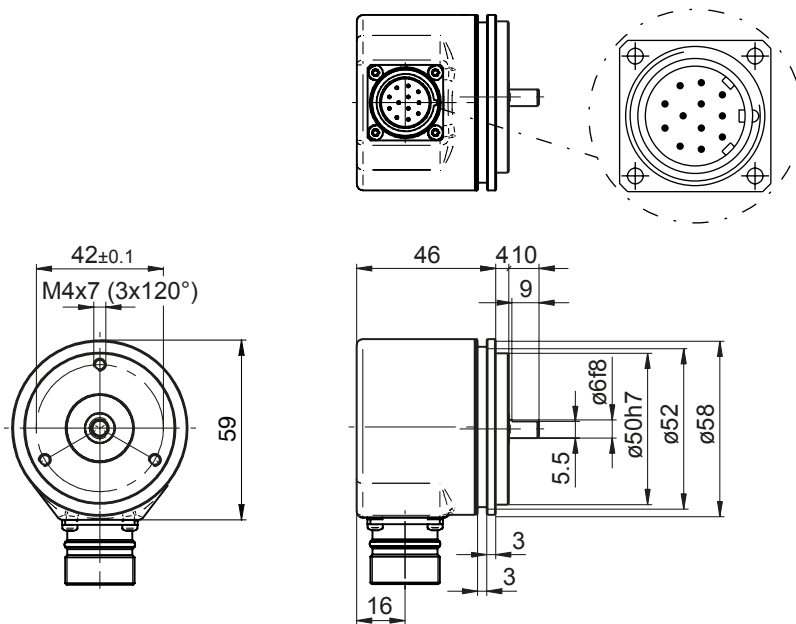
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Dimensions

Cable, radial



Connector M23, radial



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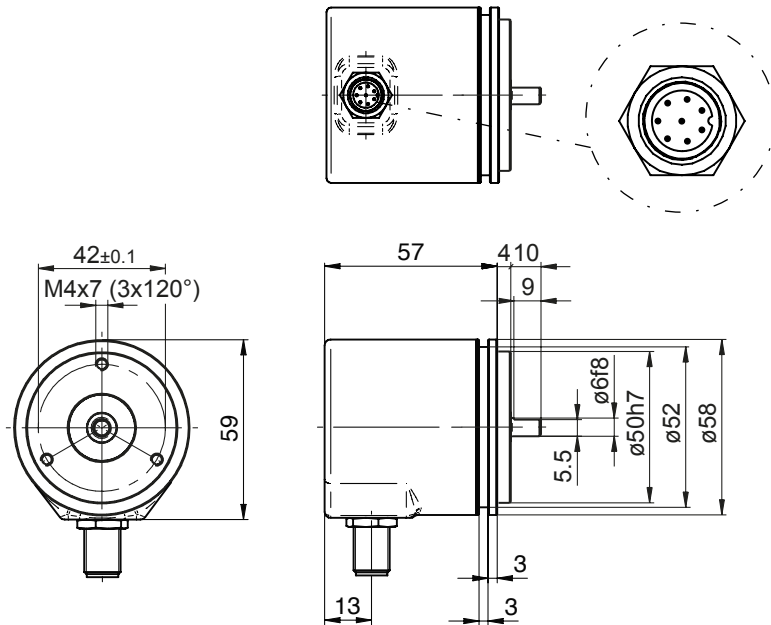
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Dimensions

Connector M12, radial



Connector dimensions M23

