Incremental encoders

Solid shaft with clamping or synchro flange

SIL2/PLd approval

GI357

GI357 with clamping flange

Features

- **Encoder with solid shaft ø10 mm or ø6 mm**
- **Max. 5000 pulses per revolution**
- **Optical sensing method**
- **Clamping or synchro flange**
- **High rotation speed up to 10000 rpm**
- **Compact design**
- **For safety-relevant applications in compliance with SIL2 (Safety Integrity Level 2)**

Optional

- **Additional zero pulse**

Technical data - electrical ratings

Voltage supply	24 VDC +20/-50 %
Reverse polarity protection	Yes
Consumption w/o load	≤30 mA
Pulses per revolution	5...5000
Reference signal	Zero pulse 70...720° (Option)
Sensing method	Optical
Output frequency	≤150 kHz
Output signals	A 90° B + inverted
Output stages	Linedriver/RS422 Push-pull short-circuit proof
Safety operating figures	Encoder operating life: 20 years PFH: 1.16E-08 1/h SFF: >90 %
Interference immunity	DIN EN 61000-6-2
Emitted interference	DIN EN 61000-6-4
Approvals	UL approval / E63076, SIL2 approval according to DIN EN 61508 (equivalent to PLd)

Technical data - mechanical design

Size (flange)	ø58 mm
Shaft type	ø6 mm solid shaft (synchro flange) ø10 mm solid shaft (clamping flange)
Admitted shaft load	≤20 N axial ≤40 N radial
Flange	Clamping or synchro flange
Protection DIN EN 60529	IP 54 (without shaft seal), IP 65 (with shaft seal)
Operating speed	≤10000 rpm
Starting torque	≤0.015 Nm (+25 °C, IP 54) ≤0.03 Nm (+25 °C, IP 65)
Rotor moment of inertia	14.5 gcm²
Materials	Housing: aluminium Flange: aluminium
Operating temperature	-25...+85 °C
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
Connection	Connector M12, 8-pin Connector M23, 12-pin
Weight approx.	250 g

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Part number

GI357. [ ][ ][ ][ ]

Pulse number - see table

Connection
- C2 Connector M23, 12-pin, axial
- C3 Connector M23, 12-pin, radial
- M2 Connector M12, 8-pin axial
- M3 Connector M12, 8-pin, radial

Voltage supply / signals
- 70 24 VDC / push-pull
- 72 24 VDC / linedriver RS422

Flange / Solid shaft
- 0 Clamping flange / ø10 mm, IP 54
- A Clamping flange / ø10 mm, IP 65
- 1 Synchro flange / ø6 mm, IP 54
- B Synchro flange / ø6 mm, IP 65

Part number (pulse number)

22	(1000)	23	(1024)	23N*	(1024)	30	(2500)

Other pulse numbers on request.
* Version “N” with zero pulse only with connector M23.

Trigger level

Outputs	**Linedriver RS422**
Output level High	>2.5 V (I = -20 mA)
Output level Low	<0.5 V (I = 20 mA)
Load High	<20 mA
Load Low	<20 mA

Outputs	**Push-pull** short-circuit proof
Output level High	>UB -3 V (I = -20 mA)
Output level Low	<0.5 V (I = 20 mA)
Load High	<20 mA
Load Low	<20 mA

Accessories

Connectors and cables

Z 141.001	Female connector M23, 12-pin, without cable
Z 141.003	Female connector M23, 12-pin, 2 m cable
Z 141.005	Female connector M23, 12-pin, 5 m cable
Z 141.007	Female connector M23, 12-pin, 10 m cable

Mounting accessories

Z 119.006	Eccentric fixing, single
Z 119.013	Adaptor plate for clamping flange for modification into synchro flange
Z 119.015	Mounting adaptor for synchro flange
Z 119.017	Mounting adaptor for clamping flange (M3)
Z 119.025	Adaptor plate for clamping flange, mounting by eccentric fixings (order separately)
Z 119.035	Bearing flange for encoders with synchro flange

Functional safety remarks

The safety function in the master PLC must detect the following events in order to uncover dangerous errors and, in case of error, actuate appropriate safety precautions:

Non-equivalence Monitoring
The non-inverted and inverted signal lines of each safety track (A vs. A inv. and B vs. B inv.) must have non-equivalent signal levels at all times. In state transition, very short periods of time (some microseconds) are permissible in which both lines have same logical signal level. A dangerous error occurs when this short period of time is exceeded.

Line break detection
Make sure none of the signal cables A, A inv, B, B inv. is high-impedant. The encoder will utilize the high-impedant status of the safety tracks A, A inv., B, B inv. to output an error message.

Safe rotational speed
In the event of a predefined speed limit, the master control will require identical speed frequencies on both safety tracks. If not, it is a fatal error.

Safe rotational direction
The phase shift of the safety relevant incremental signals A vs. B and A inv. vs. B inv. has to be monitored. A dangerous error occurs when exceeding the given tolerances. Compliance to the defined rotational direction has to be monitored as well.

Safe stop
In case of missing state changes in at least one of the signals A, A inv., B, B inv., the customer has to ensure shaft standstill by means of a second, independent safety precaution within an acceptable amount of time depending on the facility.

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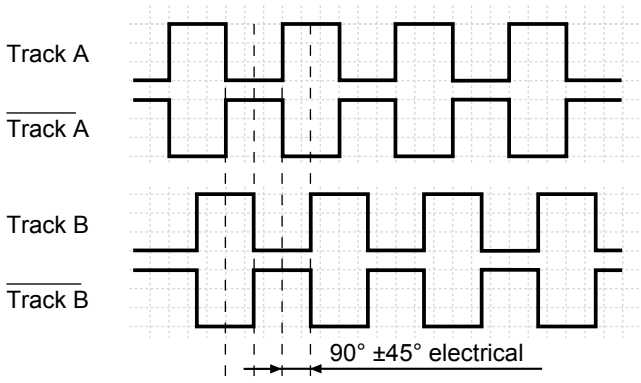
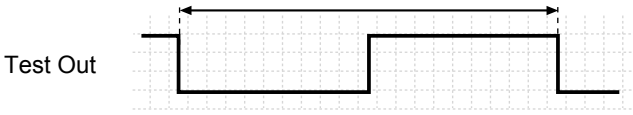
Output signals

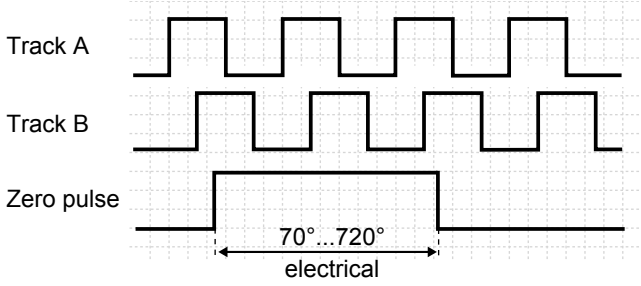
Clockwise rotating direction when looking at flange.



Pulse number 2500/1024/1000 - 360° mechanically



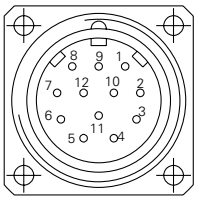
Zero pulse 70°...720° (Option)



Terminal assignment

Connector M23

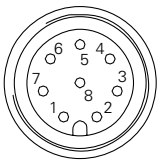
Connector	Assignment without zero pulse	Assignment with zero pulse
Pin 1	Track B inv.	Track B inv.
Pin 2	–	–
Pin 3	Test Out	Test Out
Pin 4	–	Zero pulse
Pin 5	Track A	Track A
Pin 6	Track A inv.	Track A inv.
Pin 7	–	–
Pin 8	Track B	Track B
Pin 9	–	–
Pin 10	GNDB	GNDB
Pin 11	–	GND Sense
Pin 12	UB	UB



Please use cores twisted in pairs (for example track A / track A inv.) for extension cables.

Connector M12

Connector	Assignment without zero pulse
Pin 1	Track A
Pin 2	Track B
Pin 3	Track A inv.
Pin 4	Track B inv.
Pin 5	–
Pin 6	Test Out
Pin 7	GNDB
Pin 8	UB



Please use cores twisted in pairs (for example track A / track A inv.) for extension cables.

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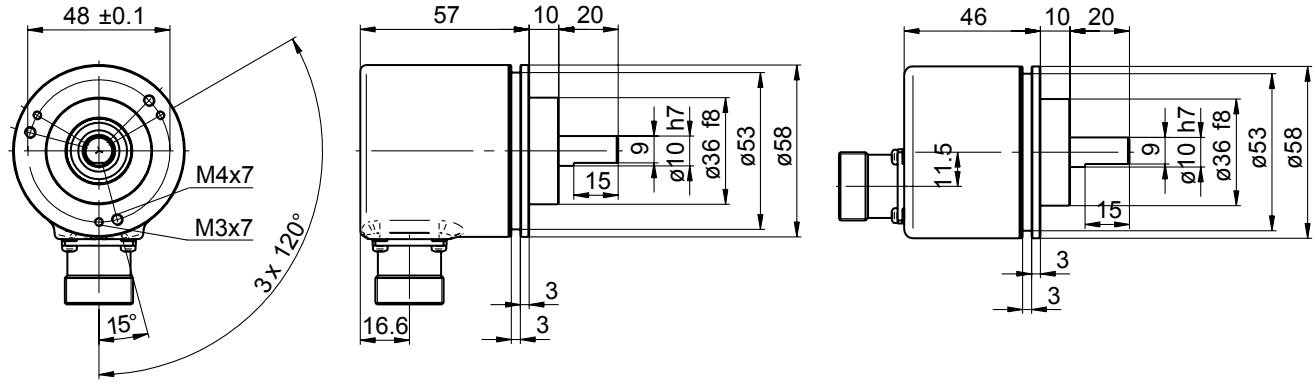
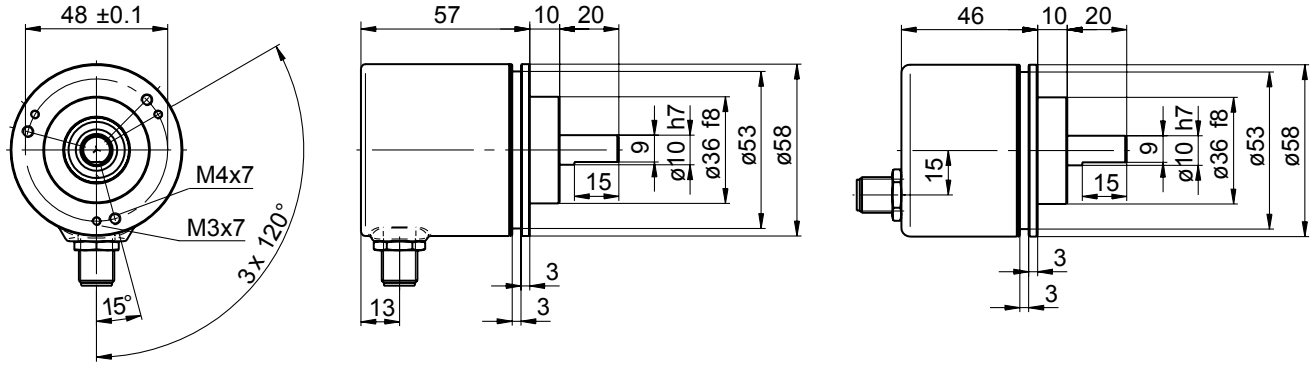
Dimensions

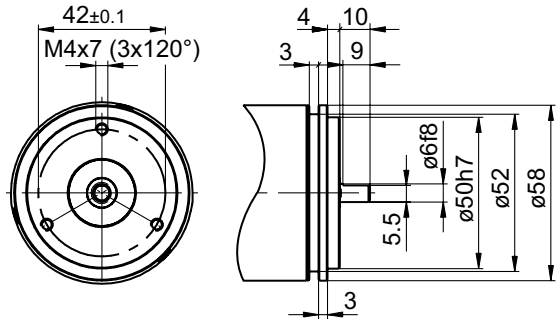
GI357 - clamping flange / connector M23



GI357 - clamping flange / connector M12



GI357 - synchro flange



GI357 - connector dimensions