Absolute encoders - SSI

Solid shaft with clamping flange, stainless steel housing
Optical multiturn encoders 14 bit ST / 12 bit MT

GE404

GE404 with clamping flange

Features

– **Encoder multiturn / SSI**
– **Stainless steel design V4A**
– **Optical sensing method**
– **Resolution: singleturn 14 bit, multiturn 12 bit**
– **Electronic setting of zero point**
– **Counting direction input**
– **Available with additional incremental output**
– **Viton sealing resistant against chemical agents**
– **Maximum resistant against magnetic fields**

Optional

– **Resolution: singleturn 18 bit, multiturn 12 bit**

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
Interface	SSI
Function	Multiturn
Steps per revolution	≤16384 / 14 bit
Number of revolutions	4096 / 12 bit
Absolute accuracy	±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 output	2048 pulses A90°B (optional)
Interference immunity	DIN EN 61000-6-2
Emitted interference	DIN EN 61000-6-4
Diagnostic functions	Self-diagnosis Multiturn sensing
Approval	UL approval / E63076

Technical data - mechanical design

Size (flange)	ø58 mm
Shaft type	ø10 mm solid shaft
Flange	Clamping flange
Protection DIN EN 60529	IP 67
Operating speed	≤10000 rpm (mechanical) ≤6000 rpm (electric)
Starting acceleration	≤1000 U/s²
Starting torque	≤0.03 Nm (+25 °C)
Rotor moment of inertia	20 gcm²
Admitted shaft load	≤20 N axial ≤40 N radial
Materials	Housing: stainless steel 1.4404 Flange: stainless steel 1.4404
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 200 g, 6 ms
Weight approx.	600 g
Connection	Connector M23, 12-pin

8/2/2019

Part number

GE404. | A | | | |

Pulses / Incremental output
02 No incremental output
04 2048 pulses / push-pull
06 2048 pulses / RS422
07 2048 periods / SinCos

Connection
A1 Connector M23, 12-pin, radial
A3 Connector M23, 12-pin, radial, for incremental output 04/06/07

Voltage supply / signals
10 10...30 VDC / gray code 25 bit (ST 13 + MT 12)
12 10...30 VDC / binary code 25 bit (ST 13 + MT 12)
20 10...30 VDC / gray code 24 bit (ST 12 + MT 12)
90 10...30 VDC / gray code 26 bit (ST 14 + MT 12)
C0 10...30 VDC / gray code 30 bit (ST 18 + MT 12)
C2 10...30 VDC / binary code 30 bit (ST 18 + MT 12)

Flange / Solid shaft
A Clamping flange / ø10 mm, IP 67

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Accessories	
Connectors and cables	
11034361	Female connector M23, 12-pin, stainless steel, without cable (Z 189.001)
11034362	Female connector M23, 12-pin, stainless steel, 10 m cable (Z 189.007)
Mounting accessories	
10125051	Mounting adaptor for encoders with clamping flange (M3) (Z 119.017)
11191971	Spring washer coupling - stainless steel D1=10 / D2=10 (Z 121.G03)

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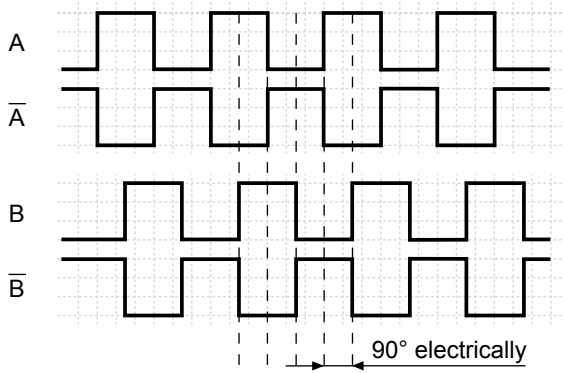## Solid shaft with clamping flange, stainless steel housing
Optical multiturn encoders 14 bit ST / 12 bit MT
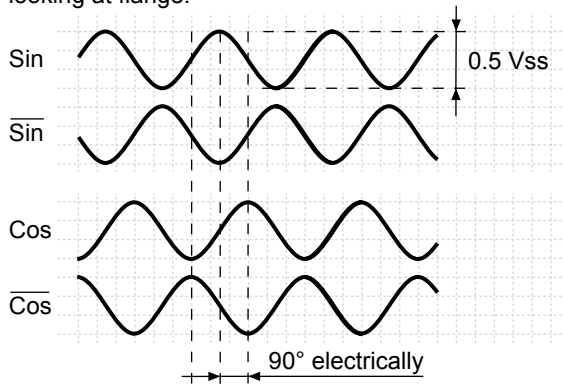
GE404

Output signals

Push-pull and RS422
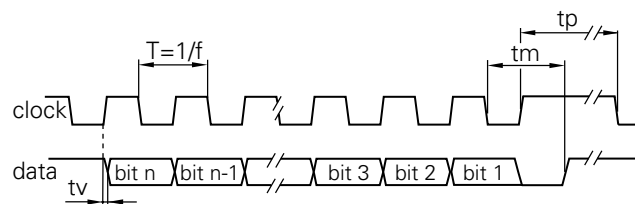A leading B when rotating the shaft clockwise and looking at flange.

90° electrically

SinCos
Sin leading Cos when rotating the shaft clockwise and looking at flange.

0.5 Vss

90° electrically

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, RS422 with terminating resistor
SSI-Data	Linedriver RS422 or RS485

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	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

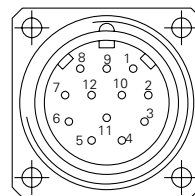# Absolute encoders - SSI
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Terminal significance	
UB	Encoder voltage supply.
GND	Encoder ground connection relating to UB.
Data+	Positive, serial data output of differential linedriver.
Data-	Negative, serial data output of differential linedriver.
Clock+	Positive SS 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/$\overline{DOWN}$). Connect to GND after setting operation for maximum interference immunity. Impulse duration $\geq$100 ms.
$\overline{DATAVALID}$	Diagnostic output. An error warning is given at level Low. Important: Interferences must be drained by the downstram electronics.
$\overline{DATAVALID\ MT}$	Diagnostic output for monitoring the multiturn sensor voltage supply. Upon dropping below a defined voltage level the $\overline{DV\ MT}$ output is switched to Low.
UP/$\overline{DOWN}$	UP/$\overline{DOWN}$ counting direction input. This input is standard on High. UP/$\overline{DOWN}$ means ascending output data with clockwise shaft rotation when looking at flange. UP/$\overline{DOWN}$-Low means ascending values with counterclockwise shaft rotation when looking at flange.
Incremental Outputs	Incremental tracks A 90° B and inverted.

Terminal assignment

GE404

Connector	Core colour	Assignment
Pin 1	brown	UB
Pin 2	white	GND
Pin 3	blue	Clock+
Pin 4	green	Data+
Pin 5	grey	Zero setting
Pin 6	yellow	Data-
Pin 7	red	Clock-
Pin 8	red/blue	$\overline{DATAVALID}$
Pin 9	pink	UP/$\overline{DOWN}$
Pin 10	violet	$\overline{DATAVALID\ MT}$
Pin 11-12	–	–

GE404 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.	$\overline{Cosine}$
Pin 9	pink	UP/$\overline{DOWN}$	UP/$\overline{DOWN}$
Pin 10	violet	Track A inv.	$\overline{Sine}$
Pin 11	black	Track A	Sine
Pin 12	grey/pink	Track B	Cosine

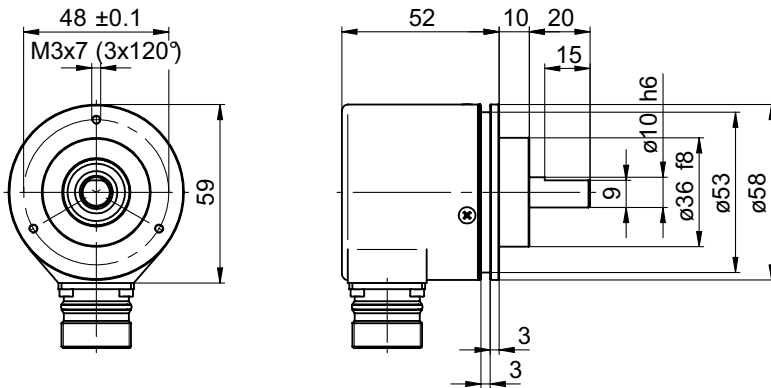Please use cores twisted in pairs (for example clock+ / clock-) for extension cables of more than 10 m length.

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Dimensions

GE404 - clamping flange

GE404 - connector dimensions