

# Absolute encoders - SSI

## Through hollow shaft up to $\varnothing 14$ mm

### Optical multiturn encoders 14 bit ST / 12 bit MT

#### G0M2H



G0M2H with through hollow shaft

#### Features

- Encoder multiturn / SSI
- Optical sensing method
- Resolution: singleturn 14 bit, multiturn 12 bit
- Through hollow shaft up to  $\varnothing 14$  mm
- Compact design
- Cost-efficient mounting
- High reliability by self-diagnostics
- Counting direction input
- Available with additional incremental output
- Maximum resistant against magnetic fields

#### Technical data - electrical ratings

Voltage supply	10...30 VDC
Reverse polarity protection	Yes
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	Multiturn
Steps per turn	$\leq 16384$ / 14 bit
Number of turns	4096 / 12 bit
Incremental output	2048 pulses A90°B + inverted
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 and zero
Output stages	SSI data: linedriver RS485 Diagnostic outputs push-pull
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)	$\varnothing 58$ mm
Shaft type	$\varnothing 10$ mm (through hollow shaft) $\varnothing 12$ mm (through hollow shaft) $\varnothing 14$ mm (through hollow shaft)
Protection DIN EN 60529	IP 54, IP 65 (optional)
Operating speed	$\leq 6000$ rpm (mechanical) $\leq 6000$ rpm (electric)
Starting acceleration	$\leq 1000$ U/s <sup>2</sup>
Starting torque	$\leq 0.04$ Nm (IP 54)
Rotor moment of inertia	20 gcm <sup>2</sup>
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 10 g, 16-2000 Hz DIN EN 60068-2-27 Shock 200 g, 6 ms
Weight approx.	400 g
Connection	Connector M23, 12-pin Cable 1 m

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#### Part number

GOM2H.

#### 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
- 21 Cable 1 m, radial
- 41 Cable 1 m, 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)
- 92 10...30 VDC / binary code 26 bit (ST 14 + MT 12)

#### Through hollow shaft / clamping ring

- 8  $\varnothing 10$  mm, without pin / on flange
- 9  $\varnothing 10$  mm, pin 15 mm / on flange
- 0  $\varnothing 12$  mm, without pin / on flange
- 1  $\varnothing 12$  mm, pin 15 mm / on flange
- 4  $\varnothing 14$  mm, without pin / on flange
- 5  $\varnothing 14$  mm, pin 15 mm / on flange
- L  $\varnothing 12$  mm, without pin / on housing
- A  $\varnothing 12$  mm, pin 23.5 mm / on housing
- M  $\varnothing 14$  mm, without pin / on housing
- E  $\varnothing 14$  mm, pin 23.5 mm / on housing

#### Accessories

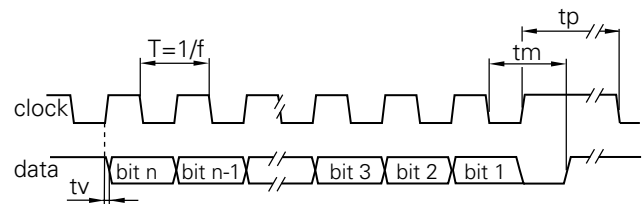
##### Connectors and cables

Z 130.001	Female connector M23, 12-pin, without cable
Z 130.003	Female connector M23, 12-pin, 2 m cable
Z 130.005	Female connector M23, 12-pin, 5 m cable
Z 130.007	Female connector M23, 12-pin, 10 m cable
Z 182.001	Female connector M23, 12-pin, without cable (incr.)
Z 182.003	Female connector M23, 12-pin, 2 m (incr.)

##### Mounting accessories

Z 119.023	Spring coupling for encoders with $\varnothing 58$ mm housing
Z 119.024	Torque support and spring washer for encoders with 9.5 mm pin
Z 119.041	Torque support by rubber buffer for encoders with 15 mm pin
Z 119.050	Spring coupling for one-side attachment, length 35 mm
Z 119.053	Spring coupling for motor's fan guard
Z 119.072	Spring coupling for encoders with $\varnothing 58$ mm housing, hole distance 73 mm
Z 119.073	Spring coupling for encoders with $\varnothing 58$ mm housing, hole distance 68 mm
Z 119.076	Spring coupling for one-side attachment, length 115 mm
Z 119.082	Spring coupling for encoders with $\varnothing 58$ mm housing, hole distance 63 mm

#### Data transfer



Clock frequency $f$	62.5...1500 kHz
Duty cycle of T	40...60 %
Delay time $t_v$	150 ns
Monoflop time $t_m$	$26 \mu s + T/2$
Clock interval $t_p$	30 $\mu s$

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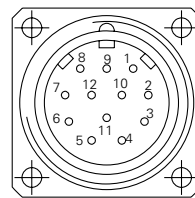
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Terminal significance	
UB	Encoder voltage supply.
GND	Encoder ground connection relating to UB.
Data+	Positive, serial data output of differential linedriver.
Data-	Negative, serial data output of differential linedriver.
Clock+	Positive SSI clock 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.
$\overline{\text{DATAVALID}}$	Diagnostic output. An error warning is given at level Low. Important: Interferences must be filtered by the downstream electronics.
$\overline{\text{DATAVALID MT}}$	Diagnostic output for monitoring the multiturn sensor voltage supply. Upon dropping below a defined voltage level the $\overline{\text{DV MT}}$ output is switched to Low.
$\overline{\text{UP/DOWN}}$	$\overline{\text{UP/DOWN}}$ 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		
<b>G0M2H</b>		
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	$\overline{\text{DATAVALID}}$
Pin 9	pink	$\overline{\text{UP/DOWN}}$
Pin 10	black/yellow	$\overline{\text{DATAVALID MT}}$
Pin 11-12	–	–

G0M2H with incremental tracks   SinCos			
Connector	Core colour	Assignment	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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**GOM2H**

<b>Trigger level</b>	
<b>SSI</b>	<b>Circuit</b>
SSI-Clock	Optocoupler
SSI-Data	Linedriver RS485
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<b>Control inputs</b>	<b>Input circuit</b>
Input level High	>0.7 UB
Input level Low	<0.3 UB
Input resistance	10 k $\Omega$
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<b>Diagnostic outputs or Incremental outputs</b>	<b>Output circuit Push-pull circuit-proof</b>
Output level High	>UB -3.5 V (I = -20 mA)
Output level Low	<0.5 V (I = 20 mA)
Load High / Low	<20 mA
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	<b>Incremental outputs</b>
	<b>Linedriver RS422</b>
	Output level High
	>2.5 V (I = -20 mA)
	Output level Low
	<0.5 V (I = 20 mA)
	Load High / Low
	<20 mA
<hr/>	
	<b>Outputs</b>
	<b>SinCos</b>
	Output level
	1 V <sub>pp</sub> $\pm 10$ %
	Load
	<10 mA

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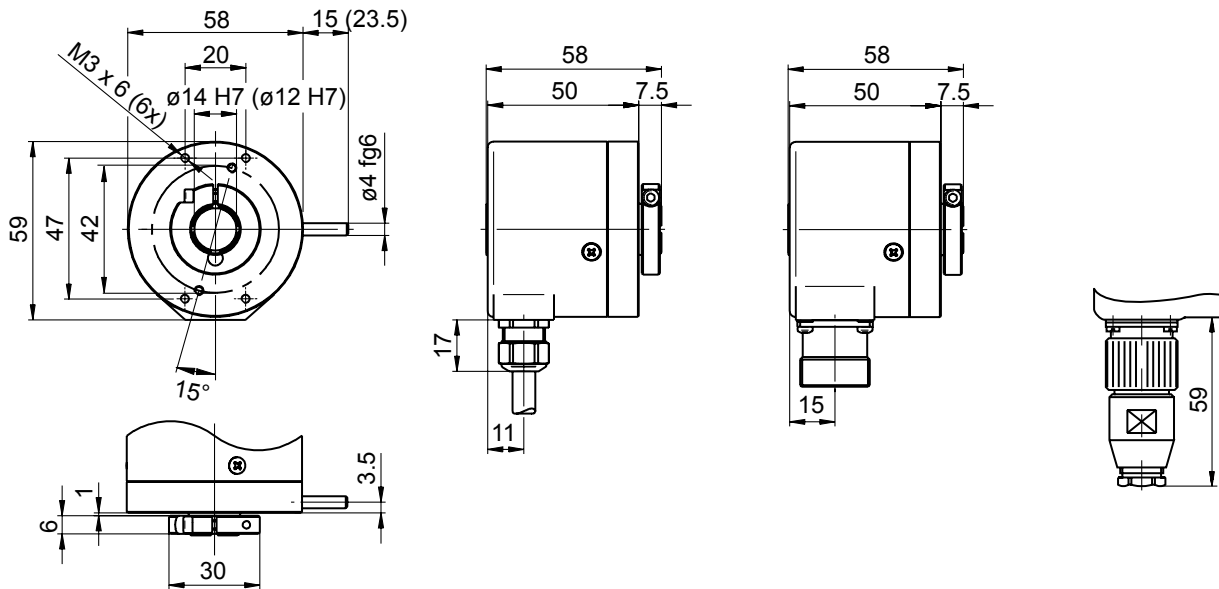
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### Dimensions

#### G0M2H - clamping ring on flange



#### G0M2H - clamping ring on housing

