Absolute encoders - SSI

Through hollow shaft up to ø14 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 ø14 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	≤50 mA (24 VDC)
Initializing time typ.	20 ms after power on
Interfaces	SSI, Incremental A 90° B (optional)
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 + inverted
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...14 mm (through hollow shaft)
Protection DIN EN 60529	IP 54, IP 65 (optional)
Operating speed	≤6000 rpm (mechanical) ≤6000 rpm (electric)
Starting acceleration	≤1000 U/s²
Starting torque	≤0.04 Nm (+25 °C, IP 54)
Rotor moment of inertia	20 gcm²
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 ±0.75 mm - 10-58 Hz 10 g - 58-2000 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

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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 ø10 mm, without pin / on flange
- 9 ø10 mm, pin 15 mm / on flange
- 0 ø12 mm, without pin / on flange
- 1 ø12 mm, pin 15 mm / on flange
- 4 ø14 mm, without pin / on flange
- 5 ø14 mm, pin 15 mm / on flange
- L ø12 mm, without pin / on housing
- A ø12 mm, pin 23.5 mm / on housing
- M ø14 mm, without pin / on housing
- E ø14 mm, pin 23.5 mm / on housing

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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)
Mounting accessories	
10140347	Torque support and spring washer for encoders with 9.5 mm pin (Z 119.024)
10139345	Torque support by rubber buffer for encoders with 15 mm pin (Z 119.041)
10147837	Spring coupling for one-side attachment, length 35 mm (Z 119.050)
11034106	Spring coupling for motor’s fan guard (Z 119.053)
10165157	Spring coupling for encoders with ø58 mm housing, hole distance 73 mm (Z 119.072)
11034121	Spring coupling for encoders with ø58 mm housing, hole distance 68 mm (Z 119.073)
11034123	Spring coupling for one-side attachment, length 115 mm (Z 119.076)
11003562	Spring coupling for encoders with ø58 mm housing, hole distance 63 mm (Z 119.082)
11098229	Clamping ring set 16/30x6 - stainless steel (Z 119.092)

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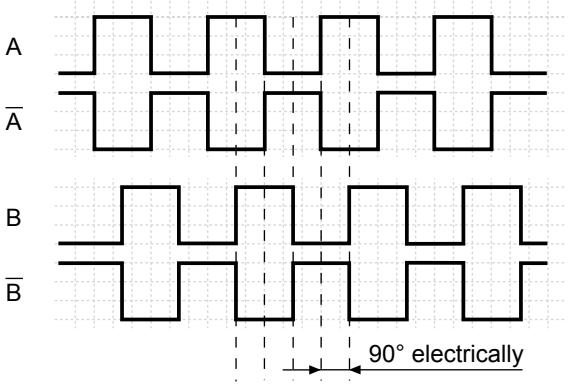
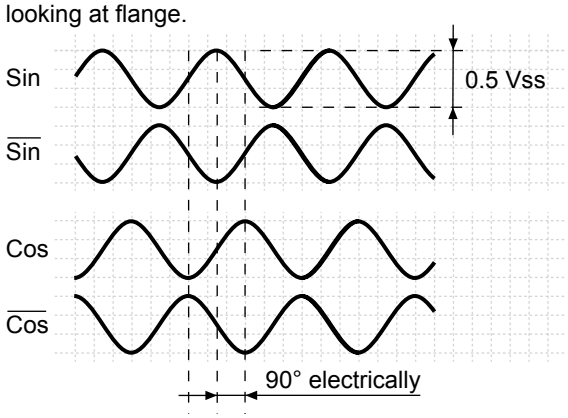
Output signals

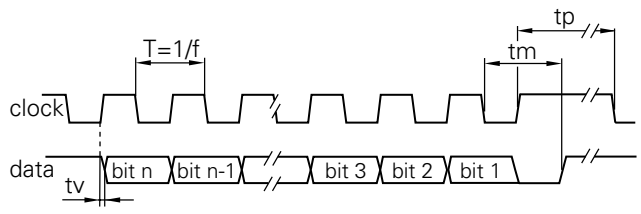
Push-pull and RS422
A leading B when rotating the shaft clockwise and looking at flange.



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, 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

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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/$\overline{\text{DOWN}}$). 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 downstram 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.
UP/$\overline{\text{DOWN}}$	UP/$\overline{\text{DOWN}}$ counting direction input. This input is standard on High. UP/$\overline{\text{DOWN}}$ means ascending output data with clockwise shaft rotation when looking at flange. UP/$\overline{\text{DOWN}}$-Low means ascending values with counterclockwise shaft rotation when looking at flange.
Incremental Outputs	Incremental tracks A 90° B and inverted.

Terminal assignment

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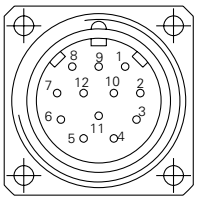
Connector	Core colour	Assignment
Pin 1	brown	UB
Pin 2	black	GND
Pin 3	blue	Clock+
Pin 4	beige	Data+
Pin 5	green	Zero setting
Pin 6	yellow	Data-
Pin 7	violet	Clock-
Pin 8	brown/yellow	$\overline{\text{DATAVALID}}$
Pin 9	pink	UP/$\overline{\text{DOWN}}$
Pin 10	black/yellow	$\overline{\text{DATAVALID MT}}$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

G0M2H 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.	$\overline{\text{Cosine}}$
Pin 9	pink	UP/$\overline{\text{DOWN}}$	UP/$\overline{\text{DOWN}}$
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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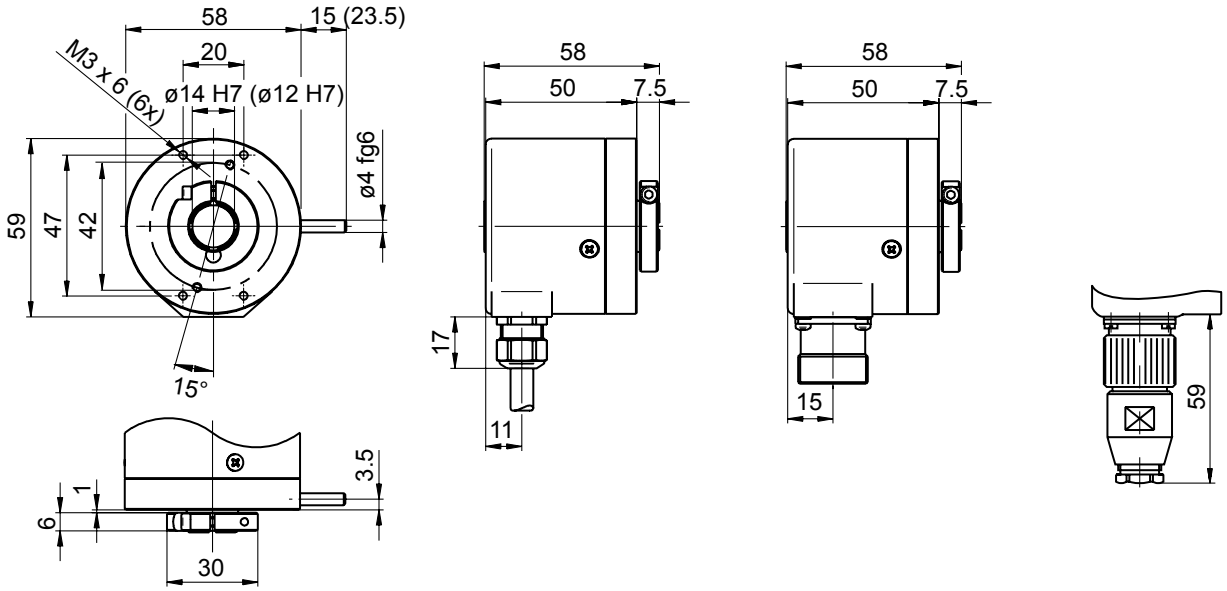
Dimensions

G0M2H - clamping ring on flange



G0M2H - clamping ring on housing