

# Absolute encoders - SSI

Blind hollow shaft up to  $\varnothing 15$  mm

Optical multiturn encoders 14 bit ST / 12 bit MT

## GXM2S



GXM2S with blind hollow shaft

### Features

- Encoder multiturn / SSI
- Optical sensing method
- Resolution: singleturn 14 bit, multiturn 12 bit
- Blind hollow shaft  $\varnothing 12... \varnothing 15$  mm
- Electronic setting of zero point
- Counting direction input
- Suitable for high positive, negative accelerations
- 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 revolution	$\leq 16384$ / 14 bit
Number of revolutions	4096 / 12 bit
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 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)	$\varnothing 58$ mm
Shaft type	$\varnothing 12...15$ mm (blind 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	$\leq 0.015$ Nm (+25 °C, IP 54)
Rotor moment of inertia	20 gcm <sup>2</sup>
Materials	Housing: steel 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 100 g, 6 ms
Weight approx.	400 g
Connection	Connector M23, 12-pin

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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
- 27 1024 periods / SinCos

### Connection

- A0 Connector M23, 12-pin, axial
- 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)
- 11 5 VDC / gray code 25 bit (ST 13 + MT 12)
- 12 10...30 VDC / binary code 25 bit (ST 13 + MT 12)
- 13 5 VDC / binary code 25 bit (ST 13 + MT 12)
- 20 10...30 VDC / gray code 24 bit (ST 12 + MT 12)
- 24 10...30 VDC / binary code 24 bit
- 90 10...30 VDC / gray code 26 bit (ST 14 + MT 12)
- 92 10...30 VDC / binary code 26 bit (ST 14 + MT 12)

### Blind hollow shaft

- 0  $\varnothing 12$  mm, without pin
- 1  $\varnothing 12$  mm, pin 15 mm
- B  $\varnothing 12$  mm, pin 9.5 mm
- 4  $\varnothing 14$  mm, without pin
- 5  $\varnothing 14$  mm, pin 15 mm
- F  $\varnothing 14$  mm, pin 9.5 mm
- U  $\varnothing 15$  mm, pin 15 mm / IP 54
- W  $\varnothing 15$  mm, without pin / IP 65

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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)

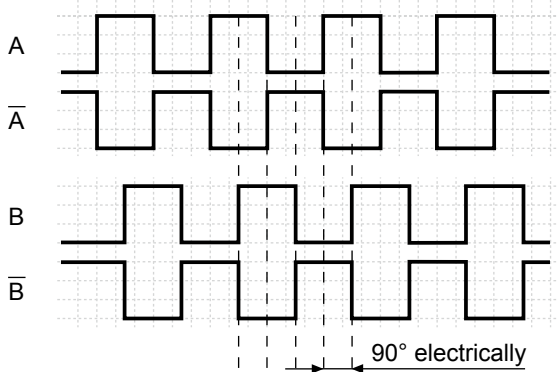
#### Mounting accessories

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 $\varnothing 58$ mm housing, hole distance 73 mm (Z 119.072)
11034121	Spring coupling for encoders with $\varnothing 58$ 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 $\varnothing 58$ mm housing, hole distance 63 mm (Z 119.082)
11098229	Clamping ring set 16/30x6 - stainless steel (Z 119.092)

### Output signals

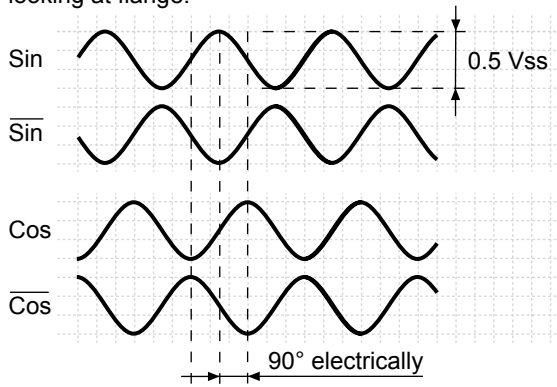
#### Push-pull and RS422

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

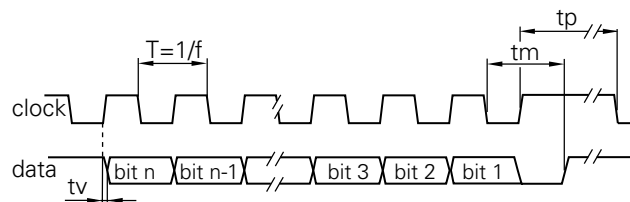


#### SinCos

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 $t_v$	150 ns
Monoflop time $t_m$	26 $\mu$ s + $T/2$
Clock interval $t_p$	30 $\mu$ s

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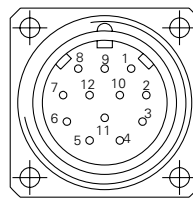
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Terminal significance	
UB	Encoder voltage supply.
GND	Encoder ground connection relating to UB.
Data+	Positive, serial data output of differential linedriver.
Data-	Negative, serial data output of differential linedriver.
Clock+	Positive SSI clock 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 $\geq 100$ ms.
$\overline{\text{DATAVALID}}$	Diagnostic output. An error warning is given at level Low. Important: Interferences must be drained 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		
GXM2S		
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	–	–

#### GXM2S 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	$\overline{\text{UP/DOWN}}$	$\overline{\text{UP/DOWN}}$	
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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### Trigger level

SSI	Circuit	Incremental outputs	Linedriver RS422
SSI-Clock	Optocoupler, RS422 with terminating resistor	Output level High	$>2.5$ V (I = -20 mA)
SSI-Data	Linedriver RS422 or RS485	Output level Low	$<0.5$ V (I = 20 mA)
		Load High / Low	$<20$ mA

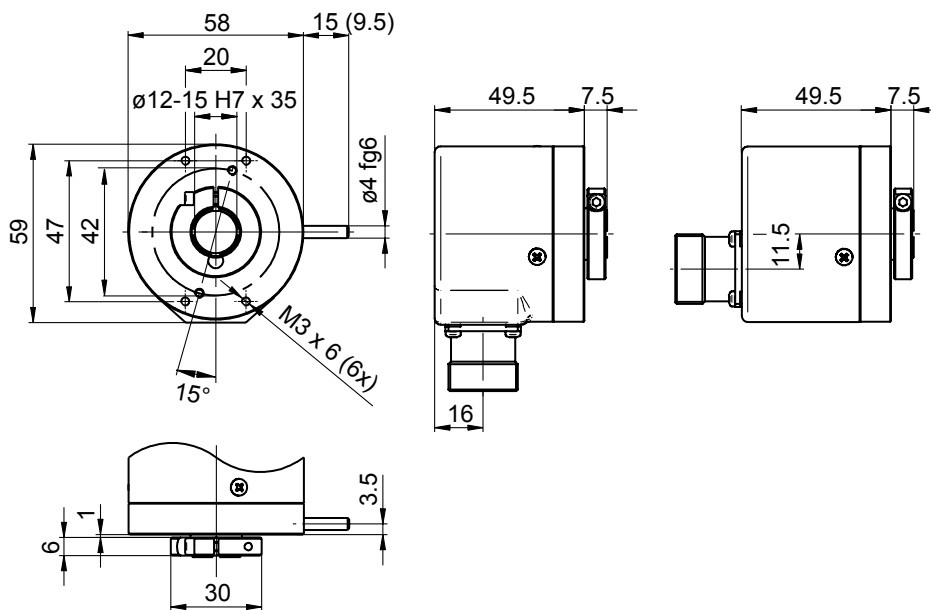
Control inputs	Input circuit	Outputs	SinCos
Input level High	$>0.7$ UB	Output level	$0.5$ Vpp $\pm 10$ % (Output signals before difference formation)
Input level Low	$<0.3$ UB	Load	$<10$ mA
Input resistance	10 k $\Omega$		

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

### Dimensions

#### GXM2S



#### Connector dimensions

