

GBM2S

Blind hollow shaft up to $\varnothing 15$ mm

Optical multiturn encoders 18 bit ST / 12 bit MT

Overview

- High resolution encoder multiturn / SSI
- Optical sensing method
- Resolution: singleturn 18 bit, multiturn 12 bit
- Blind hollow shaft $\varnothing 12 \dots \varnothing 15$ mm
- High reliability by self-diagnostics
- Counting direction input
- Electronic setting of zero point
- Available with additional incremental output
- Maximum resistant against magnetic fields



Technical data

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 Incremental A 90° B (optional)
Function	Multiturn
Steps per revolution	262144 / 18 bit
Number of revolutions	4096 / 12 bit
Absolute accuracy	$\pm 0,01^\circ$
Sensing method	Optical
Code	Gray or binary
Code sequence	CW/CCW coded by connection
Inputs	SSI clock: RS422 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	EN 61000-6-2
Emitted interference	EN 61000-6-4
Diagnostic function	Self-diagnosis Multiturn sensing

Technical data - electrical ratings

Approval UL approval / E63076

Technical data - mechanical design

Size (flange)	$\varnothing 58$ mm
Shaft type	$\varnothing 12 \dots 15$ mm (blind hollow shaft)
Protection EN 60529	IP 54 IP 65 (optional)
Operating speed	≤ 6000 rpm (mechanical) ≤ 6000 rpm (electric)
Starting acceleration	≤ 1000 U/s ²
Starting torque	$\leq 0,015$ Nm (+25 °C, IP 54)
Rotor moment of inertia	20 gcm ²
Material	Housing: aluminium Flange: aluminium
Operating temperature	-25...+85 °C -40...+85 °C (optional)
Relative humidity	95 % non-condensing
Resistance	EN 60068-2-6 Vibration ± 0.75 mm - 10-58 Hz 10 g - 58-2000 Hz EN 60068-2-27 Shock 100 g, 6 ms
Weight approx.	250 g
Connection	Connector M23, 12-pin Cable 1 m

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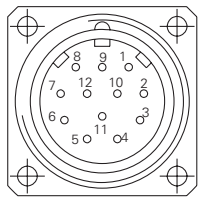
Terminal assignment

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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	DATAVALID inv.
Pin 9	pink	UP/DOWN inv.
Pin 10	black/yellow	DATAVALID MT inv.
Pin 11-12	–	–

GBM2S 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.	Cosine inv.
Pin 9	pink	UP/DOWN inv.	UP/DOWN inv.
Pin 10	violet	Track A inv.	Sine inv.
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.

Terminal significance

UB	Encoder voltage supply.
GND	Encoder ground connection relating to UB.
Data+/Data-	Differential SSI data output.
Clock+/Clock-	Differential SSI clock input. Optocoupler or RS422 input.
Zero setting	Input for setting a zero point anywhere within the 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 inv.). Connect to GND after setting operation for maximum interference immunity. Impulse duration ≥ 100 ms.
DATAVALID inv.	Diagnostic output. An error warning is given at level Low.
DATAVALID MT inv.	Diagnostic output for monitoring the multiturm sensor voltage supply. Upon dropping below a defined voltage level the DV MT inv. output is switched to Low.
UP/DOWN inv.	UP/DOWN inv. counting direction input. This input is standard on High. UP/DOWN inv. means ascending output data with clockwise shaft rotation when looking at flange. UP/DOWN inv.-Low means ascending values with counterclockwise shaft rotation when looking at flange.
Incremental Outputs	Incremental tracks A 90° B and inverted.

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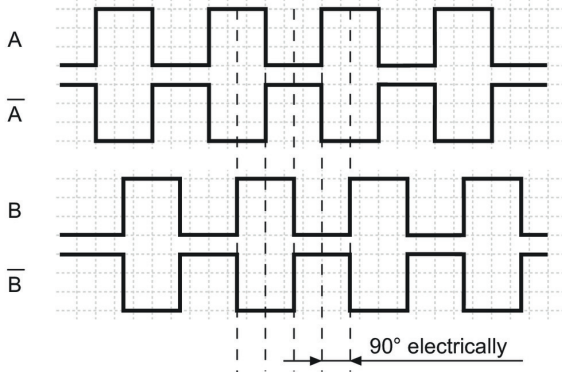
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Output signals

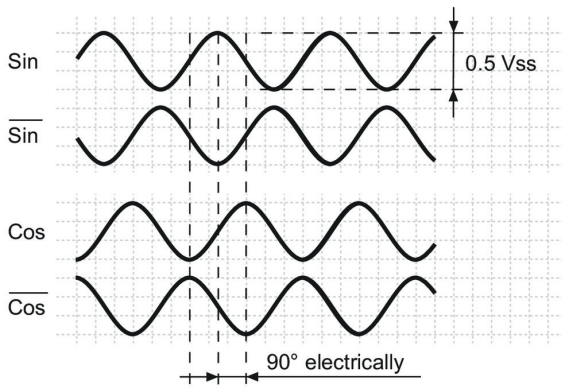
Push-pull and RS422

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.



Trigger level

SSI	Circuit
SSI-Clock	Optocoupler with switching current approx. 7 mA or RS422 with terminating resistor
SSI-Data	Linedriver RS422 or RS485

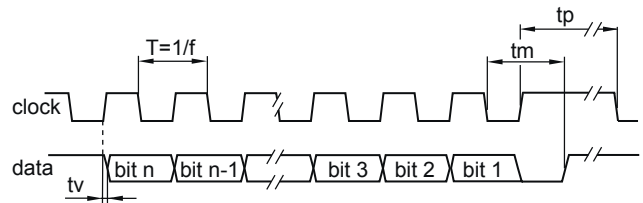
Control inputs	Input circuit
Input level High	$>0.7 U_B$
Input level Low	$<0.3 U_B$
Input resistance	10 k Ω

Diagnostic outputs or Incremental outputs	Output circuit Push-pull circuit-proof
Output level High	$>U_B - 3.5 V$ ($I = -20$ 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	$0.5 V_{pp} \pm 10\%$ (Output signals before difference formation)
Load	<10 mA

Data transfer



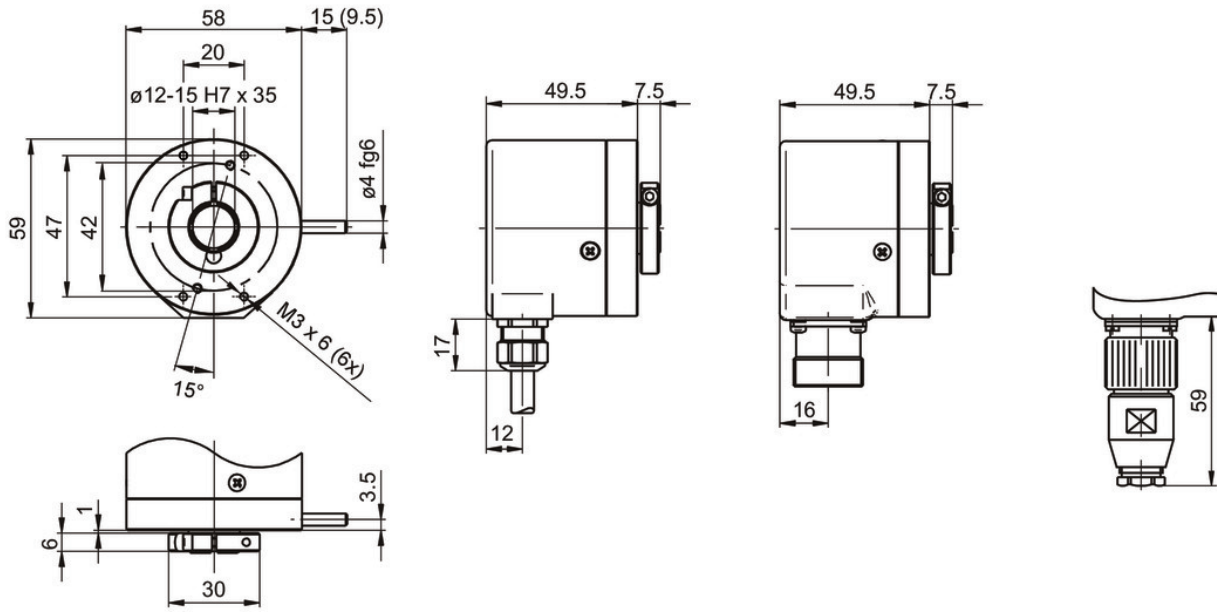
Clock frequency f	62.5... 1500 kHz
Duty cycle of T	40... 60 %
Delay time tv	150 ns
Monoflop time tm	26 μ s + T/2
Clock interval tp	30 μ s

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Dimensions



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Ordering reference

		GBM2S	.	#	##	#	##
Product		GBM2S					
Blind hollow shaft							
	$\varnothing 12$ mm, without pin					0	
	$\varnothing 14$ mm, without pin					4	
	$\varnothing 15$ mm, without pin / IP 65					W	
Voltage supply / signals							
	10...30 VDC / gray code 25 bit (ST 13 + MT 12)					10	
	10...30 VDC / binary code 25 bit (ST 13 + MT 12)					12	
Connection							
	Connector M23, 12-pin, radial						A1
	Connector M23, 12-pin, radial						A3
	Cable 1 m, radial						21
	Cable 1 m, radial, for incremental output 04/06/07						41
Pulses / Incremental output							
	No incremental output						02
	2048 pulses / push-pull						04
	2048 pulses / RS422						06
	2048 periods / SinCos						07

Accessories

Mounting accessories

11003562	Spring coupling for encoders with $\varnothing 58$ mm housing, hole distance 63 mm (Z 119.082)
11034121	Spring coupling for encoders with $\varnothing 58$ mm housing, hole distance 68 mm (Z 119.073)
10165157	Spring coupling for encoders with $\varnothing 58$ mm housing, hole distance 73 mm (Z 119.072)
11034123	Spring coupling for one-side attachment, length 115 mm (Z 119.076)
11066120	Mounting kit 056
11034106	Spring coupling for motor's fan guard (Z 119.053)
11098229	Clamping ring set 16/30x6 - stainless steel (Z 119.092)

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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)
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)