

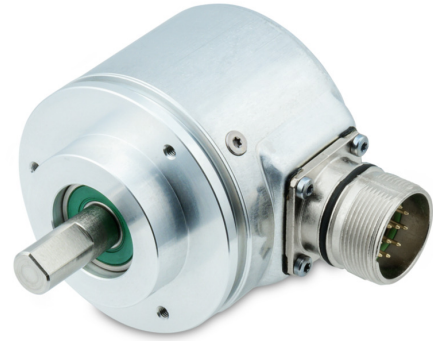
## GM400

Solid shaft with clamping flange

Optical multiturn encoders up to 14 bit ST / 16 bit MT

### Overview

- Encoder multiturn / SSI
- Optical sensing method
- Resolution: max. singleturn 14 bit, multiturn 16 bit
- Clamping flange
- Electronic setting of zero point
- Counting direction input
- Available with additional incremental outputs
- Maximum resistant against magnetic fields



### Technical data

#### Technical data - electrical ratings

Voltage supply	10...30 VDC 5 VDC $\pm$ 10 %
Reverse polarity protection	Yes (10...30 VDC) / No (5 VDC)
Consumption w/o load	$\leq$ 50 mA (24 VDC) $\leq$ 80 mA (5 VDC)
Initializing time typ.	20 ms after power on
Interface	SSI Incremental A 90° B (optional)
Function	Multiturn
Steps per revolution	$\leq$ 16384 / 14 bit
Number of revolutions	$\leq$ 65536 / 16 bit
Absolute accuracy	$\pm$ 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	512, 1024, 2048 pulses + inverted
Interference immunity	EN 61000-6-2
Emitted interference	EN 61000-6-4
Diagnostic function	Self-diagnosis Multiturn sensing
Approval	UL approval / E63076

#### Technical data - mechanical design

Size (flange)	$\varnothing$ 58 mm
Shaft type	$\varnothing$ 10 mm solid shaft
Flange	Clamping flange
Protection EN 60529	IP 54 (without shaft seal) IP 65 (with shaft seal)
Operating speed	$\leq$ 10000 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) $\leq$ 0.03 Nm (+25 °C, IP 65)
Rotor moment of inertia	20 gcm <sup>2</sup>
Admitted shaft load	$\leq$ 20 N axial $\leq$ 40 N radial
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 $\pm$ 0.75 mm - 10-58 Hz, 10 g - 58-2000 Hz EN 60068-2-27 Shock 200 g, 6 ms
Weight approx.	400 g
Connection	Connector M23, 12-pin Connector M12, 8-pin Cable 1 m

### Optional

- Stainless steel design
- Corrosion protection for offshore applications

# GM400

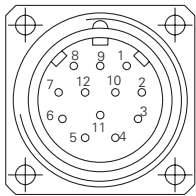
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### Terminal assignment

#### Cable or connector M23

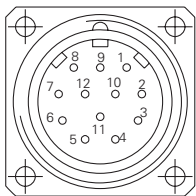
Pin	Core colour	Assignment
1	brown	UB
2	black	GND
3	blue	Clock+
4	beige	Data+
5	green	Zero setting
6	yellow	Data-
7	violet	Clock-
8	brown/yellow	DATAVALID inv.
9	pink	UP/DOWN inv.
10	black/yellow	DATAVALID MT inv.
11-12	–	–



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

#### Cable or connector M23 with incremental tracks

Pin	Core colour	Assignment
1	brown	UB
2	white	GND
3	blue	Clock+
4	green	Data+
5	grey	Zero setting
6	yellow	Data-
7	red	Clock-
8	red/blue	Track B inv.
9	pink	UP/DOWN inv.
10	violet	Track A inv.
11	black	Track A
12	grey/pink	Track B

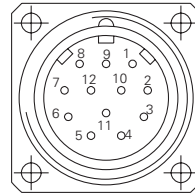


Please use cores twisted in pairs (for example clock+ / clock-) for extension cables of more than 10 m length.

### Terminal assignment

#### Cable or connector M23 with SinCos

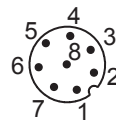
Pin	Core colour	Assignment
1	brown	UB
2	white	GND
3	blue	Clock+
4	green	Data+
5	grey	Zero setting
6	yellow	Data-
7	red	Clock-
8	red/blue	Cosine inv.
9	pink	UP/DOWN inv.
10	violet	Sine inv.
11	black	Sine
12	grey/pink	Cosine



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

#### Connector M12

Pin	Assignment
1	GND
2	UB
3	Clock+
4	Clock-
5	Data+
6	Data-
7	Zero setting
8	UP/DOWN inv.



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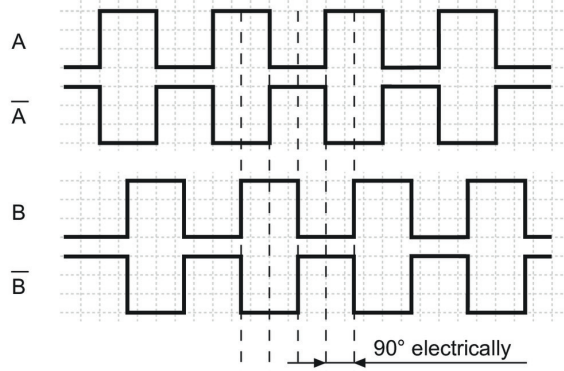
### Terminal significance

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 $\geq 100$ ms.
DATAVALID inv.	Diagnostic output. An error warning is given at level Low.
DATAVALID MT inv.	Diagnostic output for monitoring the multiturn 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.

### Output signals

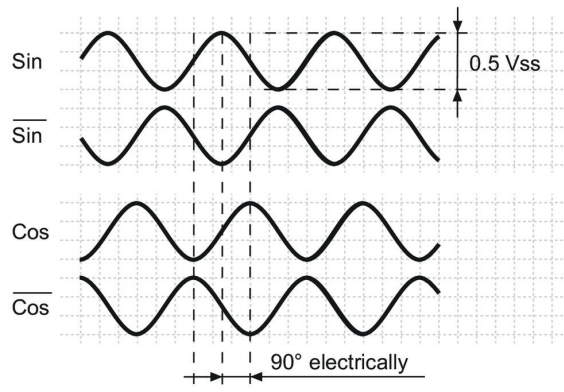
#### Push-pull and RS422

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.



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### Trigger level

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

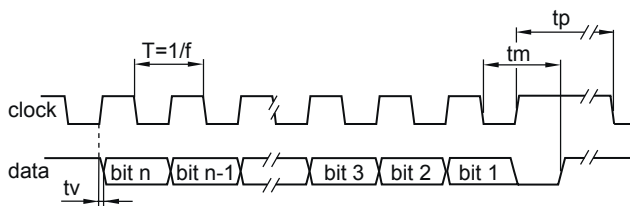
Control inputs	Input circuit
Input level High	>0.7 UB
Input level Low	<0.3 UB
Input resistance	10 kΩ

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 V <sub>pp</sub> ±10 % (Output signals before difference formation)
Load	<10 mA

### Data transfer



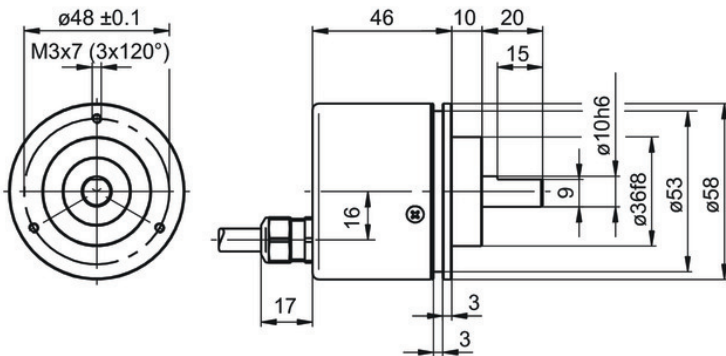
Clock frequency f	62.5...1500 kHz
Duty cycle of T	40...60 %
Delay time $t_v$	150 ns
Monoflop time $t_m$	26 μs + T/2
Clock interval $t_p$	30 μs

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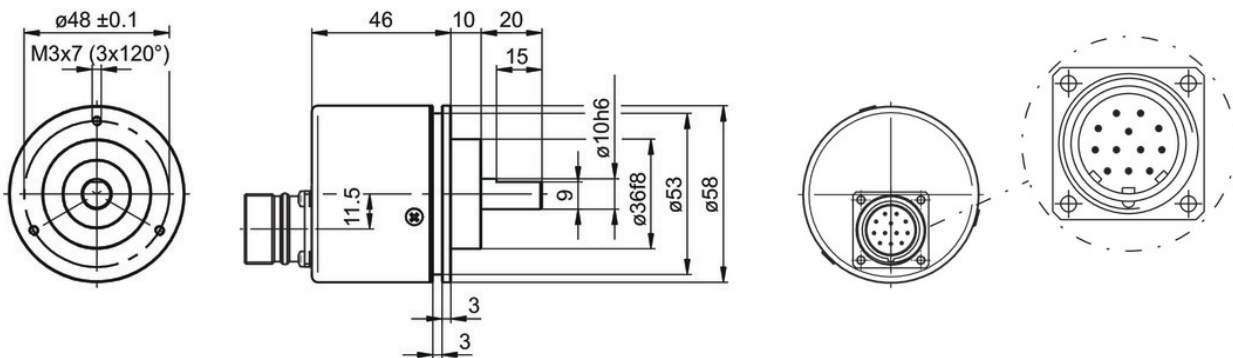
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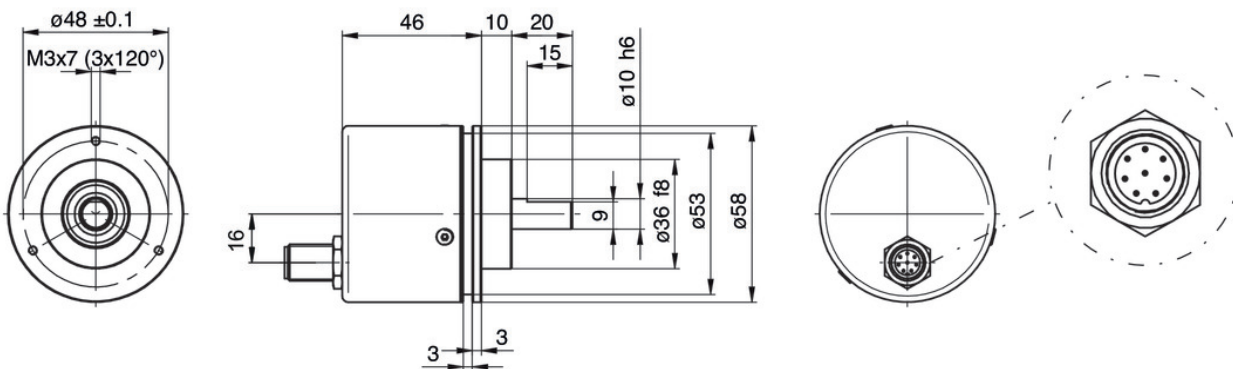
## Dimensions



Cable, axial



Connector M23, axial



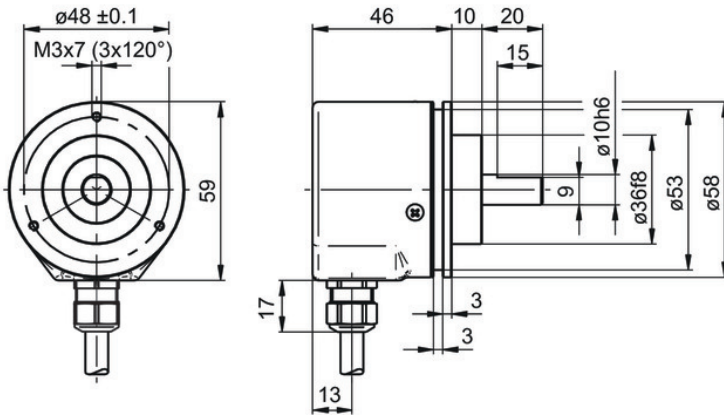
Connector M12, axial

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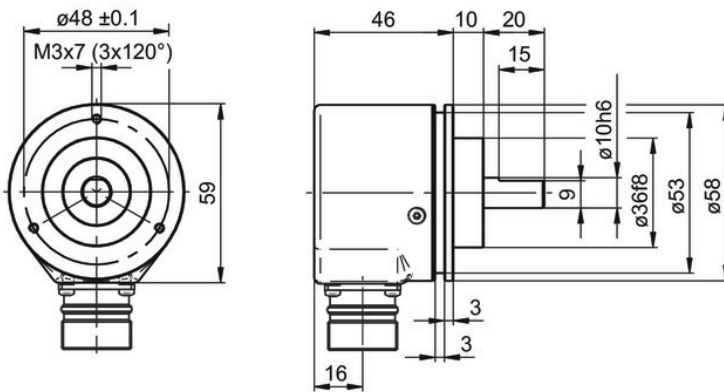
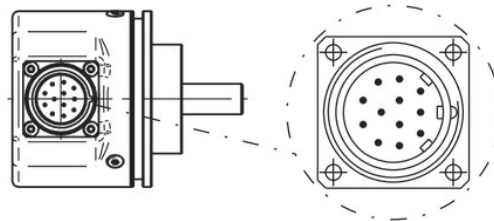
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## Dimensions



Cable, radial



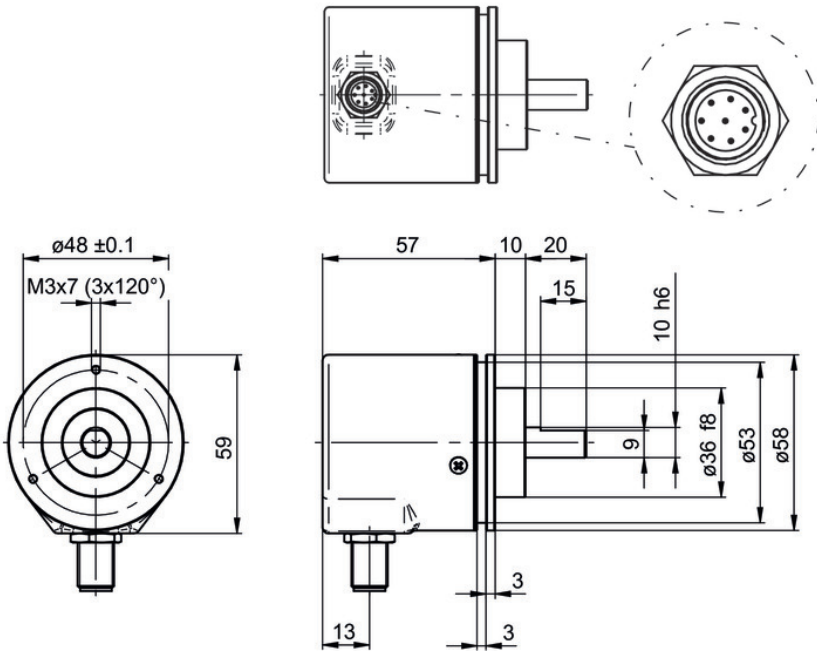
Connector M23, radial

# GM400

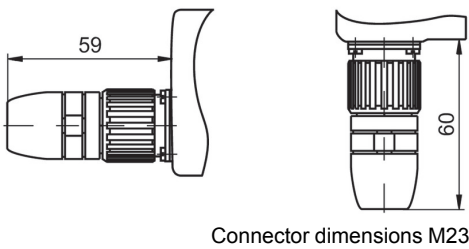
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## Dimensions



Connector M12, radial



Connector dimensions M23

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## Ordering reference

	GM400.	#	###	##	##
<b>Product</b>	GM400.				
<b>Flange / Solid shaft</b>					
Clamping flange, ø10 mm, IP 54		0			
Clamping flange, ø10 mm, IP 65		A			
<b>Voltage supply / Signals</b>					
10...30 VDC, Gray code 25 bit (ST 13 + MT 12)			10		
5 VDC, Gray code 25 bit (ST 13 + MT 12)			11		
10...30 VDC, binary code 25 bit (ST 13 + MT 12)			12		
5 VDC, binary code 25 bit (ST 13 + MT 12)			13		
10...30 VDC, Gray code 24 bit (ST 12 + MT 12)			20		
10...30 VDC, Gray code 25 bit (ST 13 + MT 12) + parity bit			30		
10...30 VDC, Gray code 24 bit (ST 12 + MT 12) + DV bit			40		
10...30 VDC, Gray code 26 bit (ST 14 + MT 12)			90		
10...30 VDC, binary code 26 bit (ST 14 + MT 12)			92		
10...30 VDC, Gray code 29 bit (ST 13 + MT 16)			A0		
<b>Connection</b>					
Cable axial, 1 m					11
Cable radial, 1 m					21
Cable 1 m, axial, for incremental output					31
Cable 1 m, radial, for incremental output					41
Flange socket M23, axial, 12-pin, male contacts, CW					A0
Flange socket M23, radial, 12-pin, male contacts, CW					A1
Flange socket M23, axial, 12-pin, male contacts, CW, for incremental output					A2
Flange socket M23, radial, 12-pin, male contacts, CW, for incremental output					A3
Flange socket M12, axial, 8-pin, male contacts, A-coded					M4
Flange socket M12, radial, 8-pin, male contacts, A-coded					M5
<b>Pulses / Incremental output</b>					
No incremental output					02
2048 pulses, push-pull					04
2048 pulses, RS422					06
2048 periods, SinCos 1 Vpp <sup>(1)</sup>					07
1024 pulses, push-pull <sup>(1)</sup>					24
1024 pulses, RS422 <sup>(1)</sup>					26
1024 periods, SinCos 1 Vpp <sup>(2)</sup>					27
512 pulses, push-pull <sup>(2)</sup>					34
512 pulses, RS422 <sup>(2)</sup>					36
512 periods, SinCos 1 Vpp <sup>(2)</sup>					37

(1) Version with 5 VDC on request

(2) On request

## Accessories

### Mounting accessories

11065545	Set of eccentric fixings type A	11065923	Coupling CPS25 (L=19, D1=10 / D2=10)
10141255	Adaptor plate for clamping flange to convert into synchro flange	11065922	Coupling CPS25 (L=19, D1=10 / D2=06)
11101781	Double loops coupling (D1=10 / D2=10)	10141132	Spring washer coupling (D1=6 / D2=10)
11050507	Bellows coupling (D1=06 / D2=10)	10141133	Spring washer coupling (D1=10 / D2=10)
		11069337	Coupling CPS37 (L=24, D1=10 / D2=06)
		11069340	Coupling CPS37 (L=24, D1=10 / D2=10)
		11053277	Bellows coupling (D1=10 / D2=10)



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#### Mounting accessories

11101893	Spring encoder arm
10125051	Mounting adaptor