

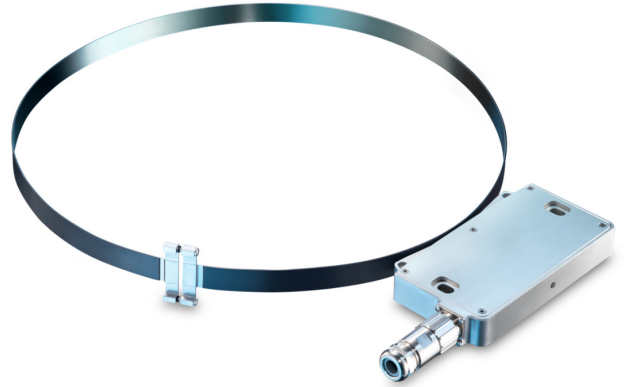
## MQR 3000F

Sensor head with magnetic tape for shaft ø300...3183 mm

Singleturn resolution up to 20 bit

### Overview

- "Quasi-absolute" (see below) encoder SSI without bearings
- Flexible design for wide shaft diameter range
- Position resolution singleturn up to 20 bit
- Speed resolution up to 18 bit, speed output
- Zero position and counting direction inputs
- Status indication via system OK output and LED
- Large mounting tolerances



### Technical data

#### Technical data - electrical ratings

Voltage supply	4.75...30 VDC
Consumption w/o load	≤300 mA (24 VDC)
Output signals	SSI data (Linedriver RS485)
Position resolution	0...20 bit singleturn
Speed resolution	≤18 bit (±20...±2000 rpm)
Code	Gray or binary
Code sequence	Positiv at CW
Input signals	SSI clock Zero position Rotating direction
Additional outputs	Square-wave HTL Square-wave TTL (RS422) SinCos
Status indicator	Color-LED, system OK output
Interference immunity	EN 61000-6-2
Emitted interference	EN 61000-6-3
Approval	CE UL approval / E217823

#### Technical data - electrical ratings (square-wave)

Pulses per revolution	1024 ... 4096
Phase shift	90 ° ±2°
Duty cycle	45...55 %
Output frequency	≤500 kHz (HTL) ≤2 MHz (TTL)
Output signals	A+, A-, B+, B-
Output stages	HTL TTL/RS422

#### Technical data - electrical ratings (SinCos)

Sinewave cycles per revolution	1024 ... 4096
Phase shift	90 ° ±2°
Output frequency	≤500 kHz
Output signals	A+, A-, B+, B-
Output stages	SinCos 1 Vpp

#### Technical data - mechanical design

Dimensions (sensor head)	165 x 25 x 93 mm
Shaft type	ø300...3183 mm (through hollow shaft)
Axial tolerance	±5 mm (belt to head)
Radial tolerance	1...3 mm (belt to head)
Protection EN 60529	IP 67
Operating speed	≤1850 rpm (ø300 mm) ≤150 rpm (ø1500 mm)
Material	Housing sensing head: aluminium alloy Magnetic belt: stainless steel (1.4310)
Operating temperature	-40...+85 °C
Resistance	IEC 60068-2-6 Vibration 30 g, 10-2000 Hz IEC 60068-2-27 Shock 300 g, 6 ms
Weight approx.	730 g (head) 120 g (belt/m) 17 g (lock)
Connection	Flange connector M23, 17-pin

### Optional

- Additional incremental output
- Parity bit

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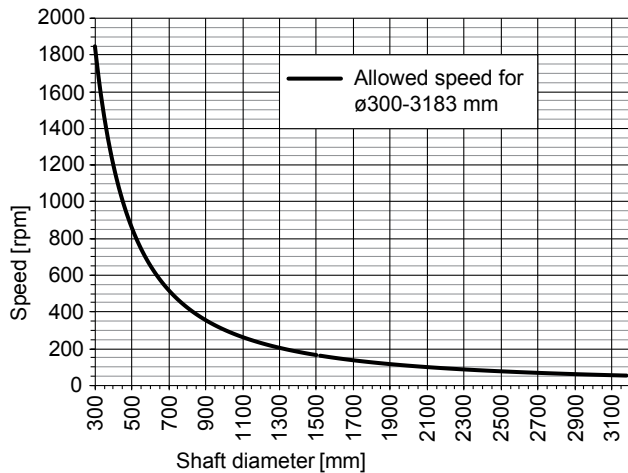
### Initialization of a validate absolute position

The MQR3000F is a "quasi-absolute" encoder.

"Quasi-absolute" means that it is an incremental encoder that provides a valid absolute position only after initialization.

Therefore the belt lock must pass the sensor head twice in the same direction. The zero position will then be set to the middle of the belt lock and the encoder delivers valid absolute position data.

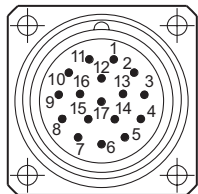
### Speed dependent on the shaft diameter



### Terminal assignment

**View A** (see dimension)

Assignment flange connector



Flange connector M23, male, 17-pin, clockwise (CW)

Pin	Assignment
1	System OK–
2	DIR
3	dnu
4	System OK+
5	ZERO
6	dnu
7	+UB
8	SSI Clk+
9	SSI Clk–
10	0V (⊥)
11	Internal shield
12	dnu (B+ *)
13	dnu (B– *)
14	SSI Data+
15	dnu (A+ *)
16	dnu (A– *)
17	SSI Data–

\* With additional output incremental

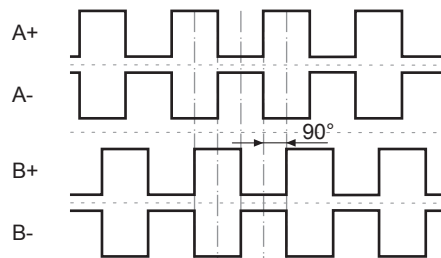
### Terminal significance

+UB	Voltage supply
0V (⊥)	Ground
SSI Data+	SSI data+
SSI Data–	SSI data–
SSI Clk+	SSI clock+
SSI Clk–	SSI clock–
A+	Additional output output signal channel 1
A–	Additional output output signal channel 1 inverted
B+	Additional output output signal channel 2 (offset by 90° to channel 1)
B–	Additional output output signal channel 2 inverted
DIR	Direction of rotation (adoption with HIGH)
ZERO	Zero setting (adoption at rising edge)
System OK+	Error output
System OK–	Error output inverted
dnu	Do not use

### Output signals

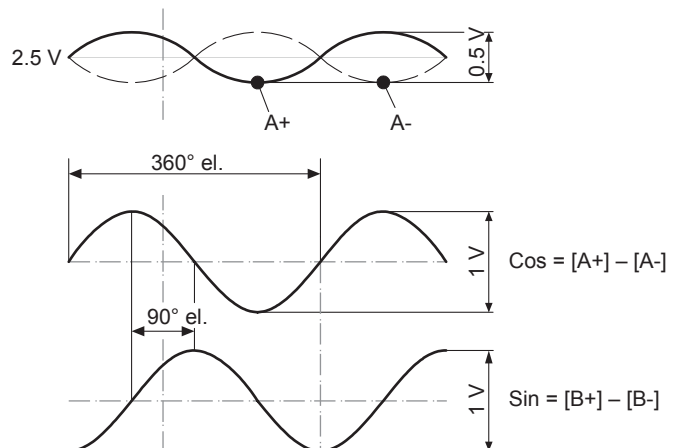
#### Additional output HTL/TTL

At positive rotating direction (see dimension)



#### Additional output SinCos

At positive rotating direction (see dimension)

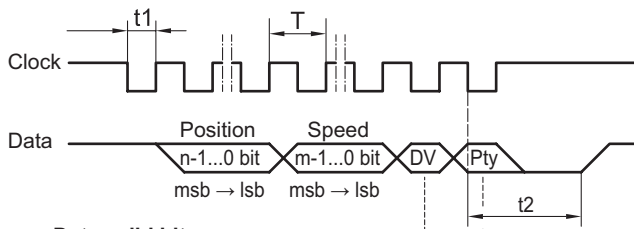


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### Data transfer



#### Data valid bit

With position output:

1 = Position output is valid and no error,

0 = Position output is not valid

Without position output:

1 = no error, 0 = error

#### Parity bit

Only for version with parity

Clock frequency	100 kHz...2 MHz
Period (T)	0.5...10 µs
Time lag (t1)	0.25...5 µs
Monoflop time (t2)	13 µs (internal)
Master wait time (t2)	15 µs (master)
n, m	Number of bits

Data valid bit and the optional parity bit are excepted from Gray code.

For continuous clocking, the SSI word is transmitted only once followed by zero values (no ring register operation).

The filter cut-off frequency  $f_{\text{filter}}$  for the speed word is fixed depending on speed range and shaft diameter.

It is calculated by:

$$f_{\text{filter}} = \{20 \text{ Hz} \leq \frac{n_{\text{max}} [\text{rpm}]}{60} \cdot \frac{\pi \cdot d [\text{mm}]}{20} \leq 500 \text{ Hz}\}$$

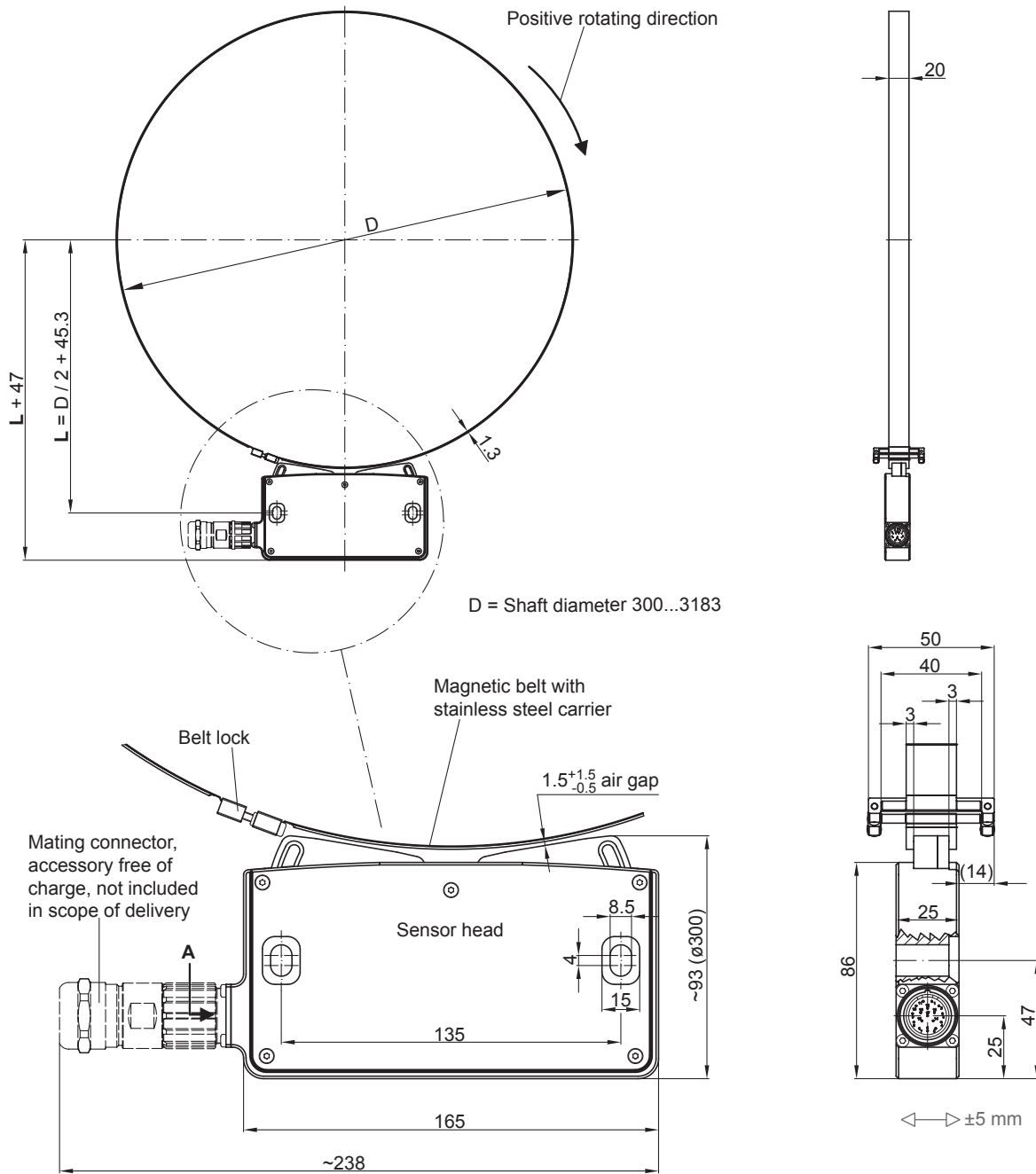
Further frequency settings on request.

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### Dimensions



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### Ordering reference

		MQR3000F	-	####	.	N	##	.	##	##	#	.	A	/	####
<b>Product</b>		Encoder without bearings - absolute	MQR3000F												
<b>Through hollow shaft (Ø mm)</b>		300 - 3185	300 - 3185												
<b>Connection</b>		Flange socket M23, 17-pin, pin contacts, CW	N												
<b>Supply voltage / output</b>		4,75-30 VDC, SSI Gray	UG												
		4,75-30 VDC, SSI binary	UB												
<b>Resolution singleturn position</b>		No position signal	00												
		13 Bit	13												
		16 Bit	16												
		20 Bit	20												
<b>Resolution speed</b>		No speed signal	00												
		12 Bit, ±20 rpm	SE												
		12 Bit, ±40 rpm	SF												
		12 Bit, ±500 rpm	SG												
		12 Bit, ±2000 rpm	SH												
		12 Bit, ±3000 rpm	SN												
		14 Bit, ±20 U/min	SI												
		14 Bit, ±40 U/min	SK												
		14 Bit, ±500 U/min	SL												
		14 Bit, ±2000 U/min	SM												
		16 Bit, ±40 rpm	S2												
		16 Bit, ±500 rpm	S3												
		16 Bit, ±2000 rpm	S4												
		18 Bit, ±500 U/min	S7												
		18 Bit, ±2000 U/min	S8												
<b>Resolution supplement</b>		No option	0												
		4096 ppr TTL/HTL push-pull (Vin=Vout), 4 channels	G												
		4096 ppr TTL (RS422), 4 channels	H												
		4096 ppr SinCos 1 Vpp, 4 channels	J												
		2048 ppr TTL/HTL push-pull (Vin=Vout), 4 channels	7												
		2048 ppr TTL (RS422), 4 channels	8												
		2048 ppr SinCos 1 Vpp, 4 channels	9												
		1024 ppr TTL/HTL push-pull (Vin=Vout), 4 channels	4												
		1024 ppr TTL (RS422), 4 channels	5												
		1024 ppr SinCos 1 Vpp, 4 channels	6												
		Modified	\$												
<b>Operating temperature</b>		-40...+85 °C	A												
<b>Parity bit</b>		None	-												
		Even	4802												
		Odd	4803												

Other versions on request.