

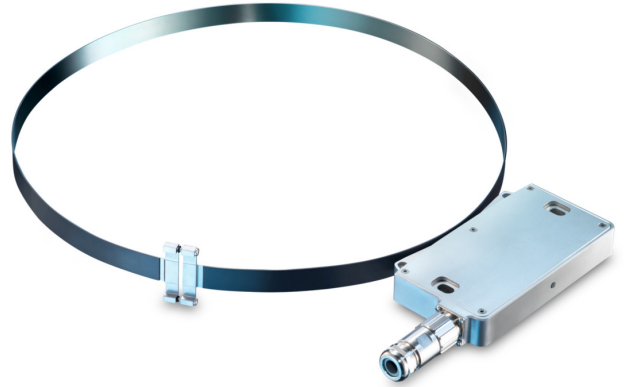
## MQR 3000F

 Sensor head with magnetic tape for shaft  $\varnothing 300 \dots 3185$  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
- Magnetic rotor included in delivery



### Technical data

#### Technical data - electrical ratings

Voltage supply	4.75...30 VDC
Consumption w/o load	$\leq 300$ mA (24 VDC)
Output signals	SSI data (Linedriver RS485)
Position resolution	0...20 bit singleturn
Speed resolution	$\leq 18$ bit ( $\pm 20 \dots \pm 2000$ 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	$90^\circ \pm 2^\circ$
Duty cycle	45...55 %
Output frequency	$\leq 500$ kHz (HTL) $\leq 2$ 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	$90^\circ \pm 2^\circ$
Output frequency	$\leq 500$ 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	$\varnothing 300 \dots 3185$ mm (through hollow shaft)
Axial tolerance	$\pm 5$ mm (belt to head)
Radial tolerance	1...3 mm (belt to head)
Protection EN 60529	IP 67
Operating speed	$\leq 1850$ rpm ( $\varnothing 300$ mm) $\leq 150$ rpm ( $\varnothing 1500$ mm)
Material	Housing sensing head: aluminium alloy Magnetic belt: stainless steel (1.4310)
Operating temperature	$-40 \dots +85^\circ\text{C}$
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

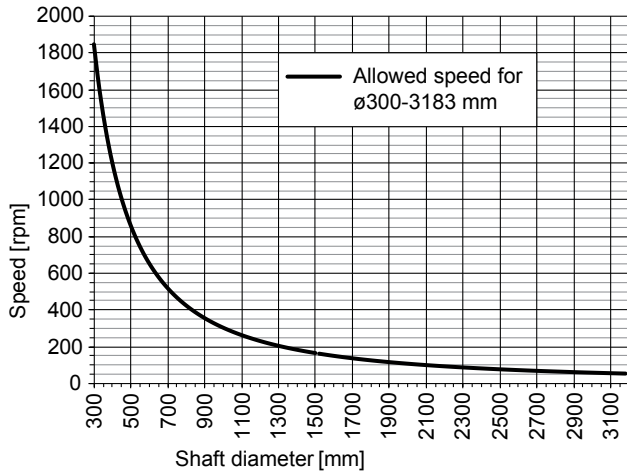
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### Initialization of a validate absolute position

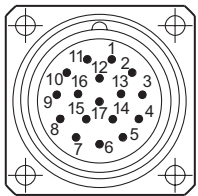
The MQR3000F is a "quasi-absolute" encoder. "Quasi-absolute" means that it is an incremental encoder that provides a valid absolute position only after initialization. Therefore the belt lock must pass the sensor head twice in the same direction. The zero position will then be set to the middle of the 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 ( $\perp$ )
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

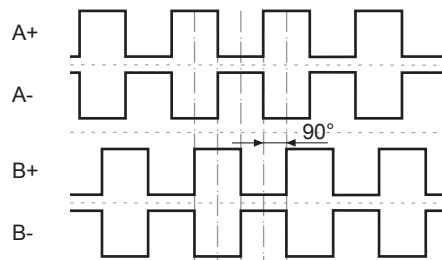
### Terminal significance

+UB	Voltage supply
0V ( $\perp$ )	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

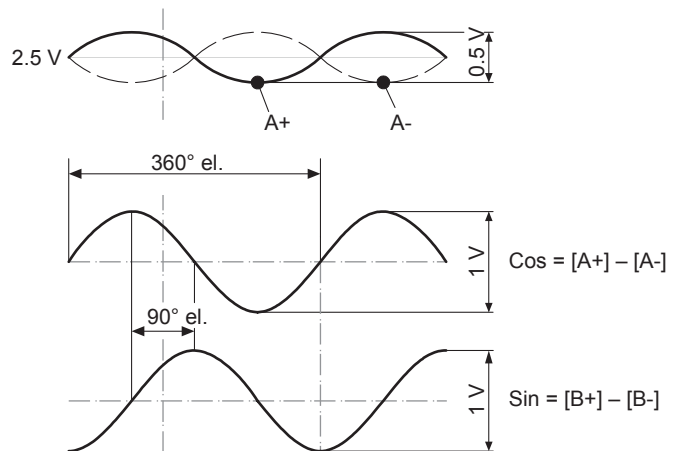
#### Additional output HTL/TTL

At positive rotating direction (see dimension)



#### Additional output SinCos

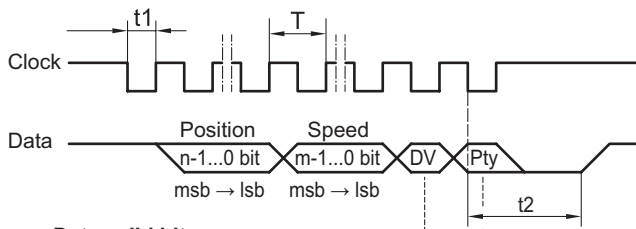
At positive rotating direction (see dimension)



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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:

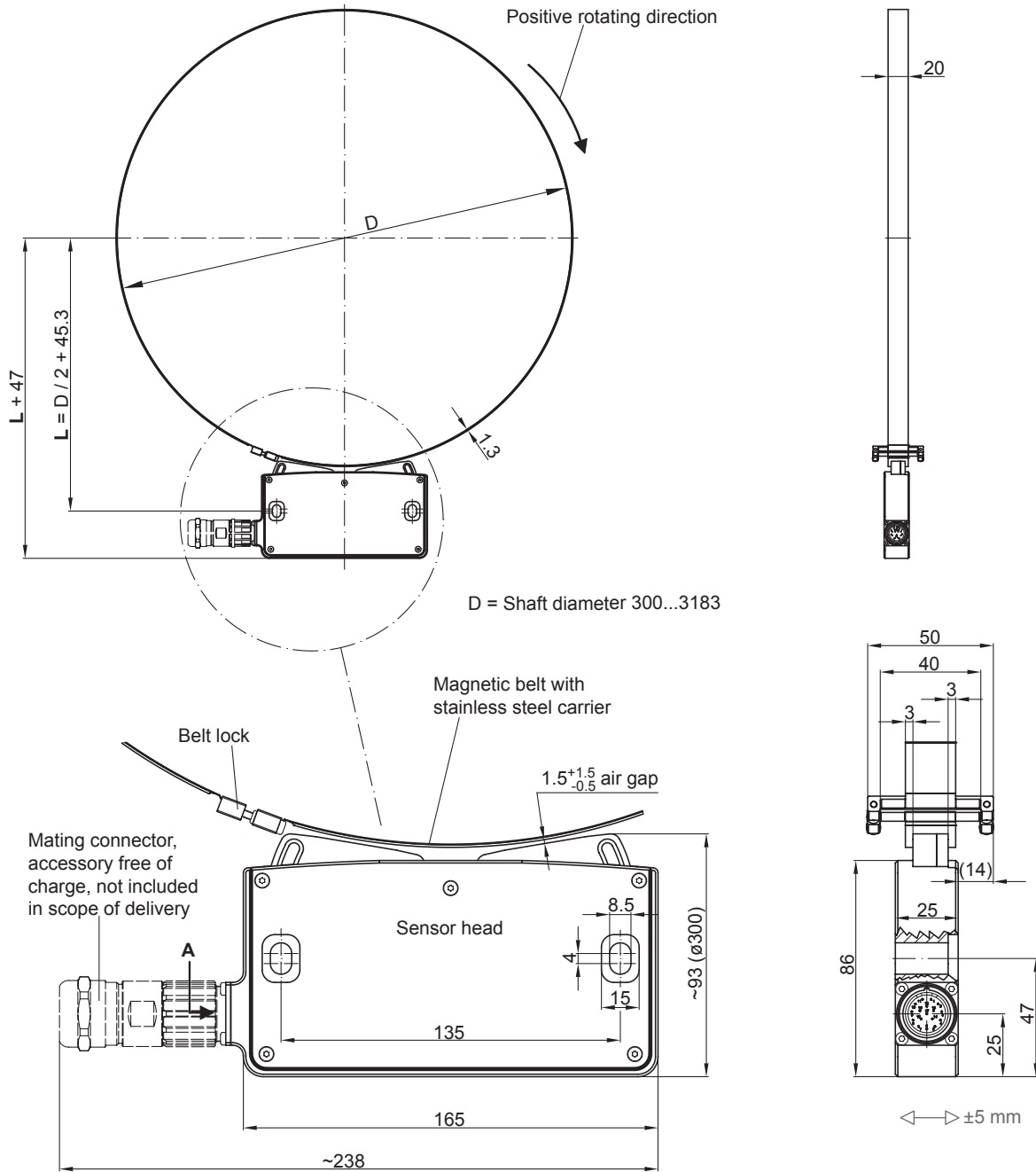
$$f_{\text{filter}} = \left\{ 20 \text{ Hz} \leq \frac{n_{\text{max}} [\text{rpm}]}{60} \cdot \frac{\pi \cdot d [\text{mm}]}{20} \leq 500 \text{ Hz} \right\}$$

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.