

MQR 3000F

Sensor head with magnetic tape for shaft $\varnothing 300 \dots 3183$ 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 ($\pm 20 \dots \pm 2000$ 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	≤ 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	$90^\circ \pm 2^\circ$
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	$\varnothing 300 \dots 3183$ 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 ($\varnothing 300$ mm) ≤ 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

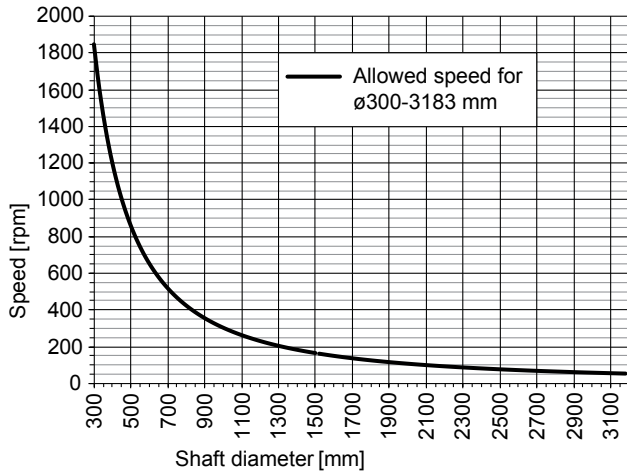
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Initialization of a validate absolute position

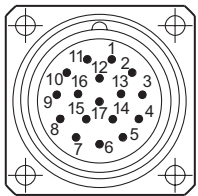
The MQR3000F is a "quasi-absolute" encoder. "Quasi-absolute" means that it is an incremental encoder that provides a valid absolute position only after initialization. Therefore the belt lock must pass the sensor head twice in the same direction. The zero position will then be set to the middle of the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

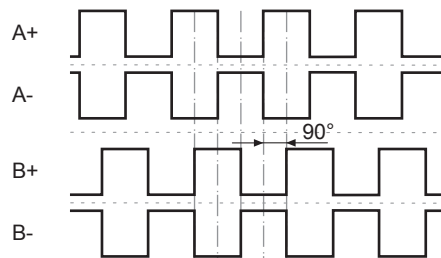
Terminal significance

+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

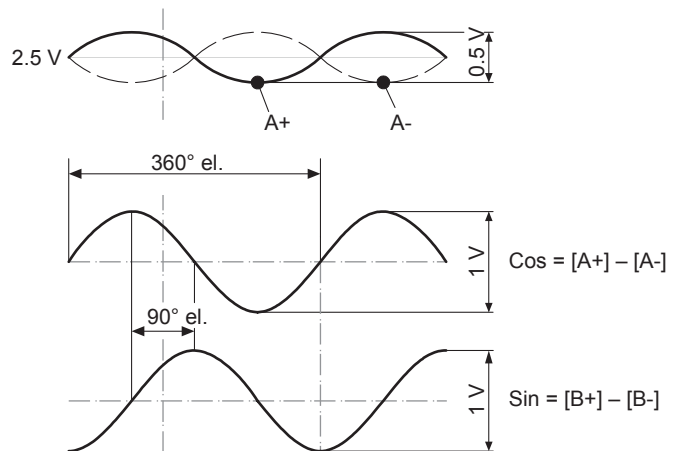
Additional output HTL/TTL

At positive rotating direction (see dimension)



Additional output SinCos

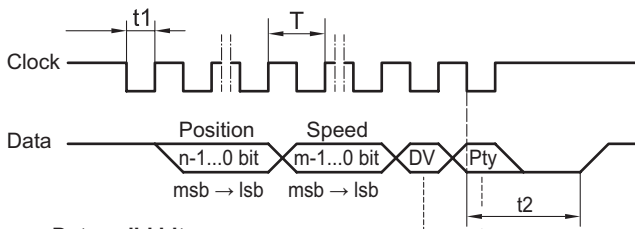
At positive rotating direction (see dimension)



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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_{filter} for the speed word is fixed depending on speed range and shaft diameter.

It is calculated by:

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

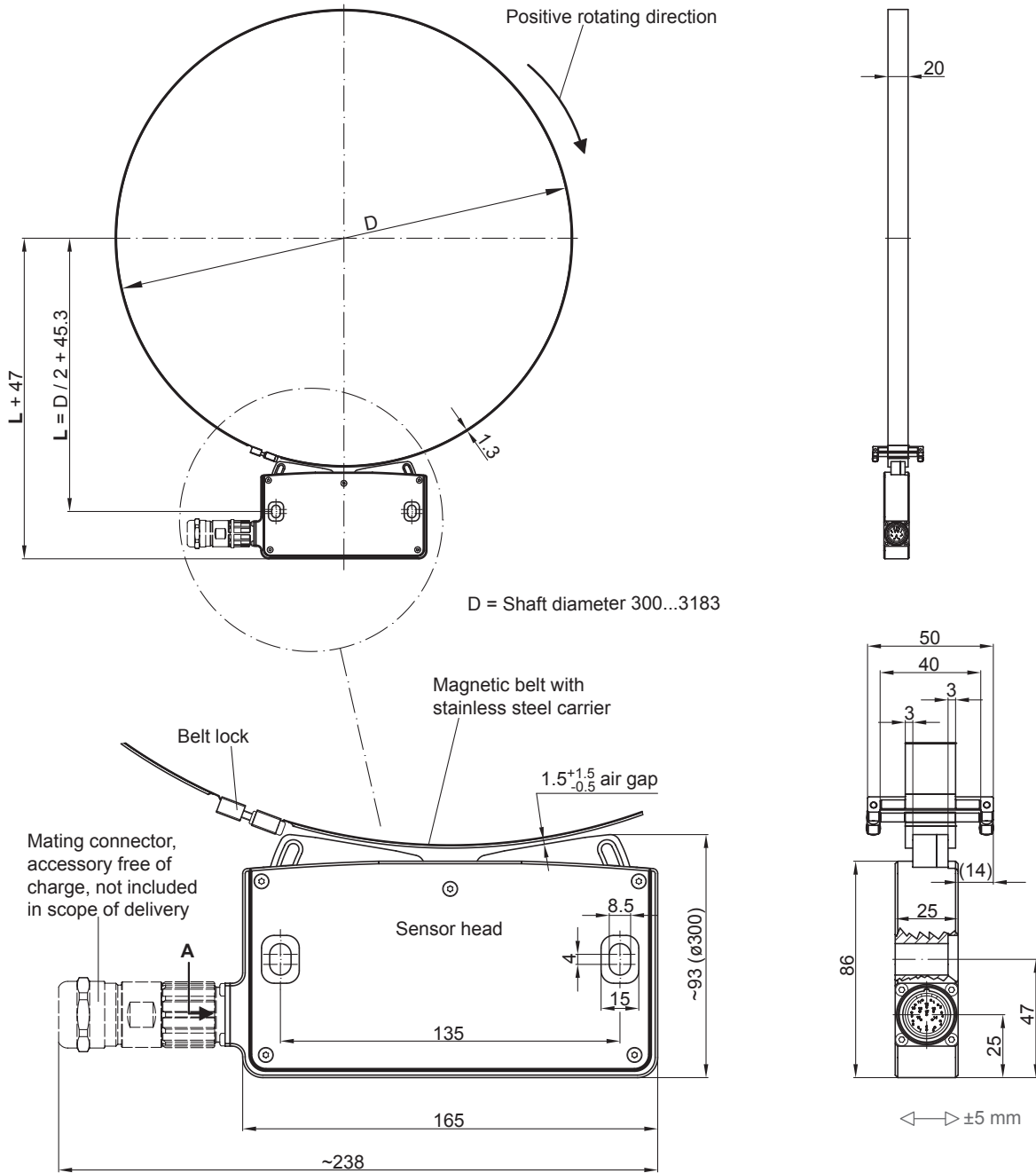
Further frequency settings on request.

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Dimensions



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Ordering reference

		MQR3000F	-	####	.	N	##	.	##	##	#	.	A	/	#####
Product															
Encoder without bearings - absolute		MQR3000F													
Through hollow shaft (Ø mm)															
300 - 3185		300 - 3185													
Connection															
Flange socket M23, 17-pin, pin contacts, CW		N													
Supply voltage / output															
4,75-30 VDC, SSI Gray		UG													
4,75-30 VDC, SSI binary		UB													
Resolution singleturn position															
No position signal		00													
13 Bit		13													
16 Bit		16													
20 Bit		20													
Resolution speed															
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													
Resolution supplement															
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		\$													
Operating temperature															
-40...+85 °C		A													
Parity bit															
None		-													
Even		4802													
Odd		4803													

Other versions on request.

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Accessories

Connectors and cables

11068551 Mating connector M23, solder version, 17-pin, CCW