

Encoders without bearings - absolute

Sensor head with magnetic tape for shaft $\varnothing 300 \dots 3183$ mm

Singleturn resolution up to 20 bit

MQR 3000F - HDmag flex



Features

- "Quasi-absolute" (see dimension) 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

Optional

- Additional incremental output
- Parity bit

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, set zero, counting direction
Additional outputs	HTL, TTL/RS422 or SinCos
Status indicator	Color-LED, system OK output
Interference immunity	EN 61000-6-2
Emitted interference	EN 61000-6-3
Approvals	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

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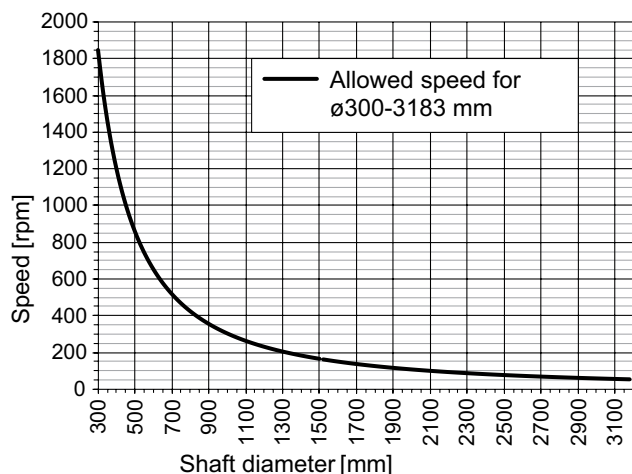
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Technical data - mechanical design

Shaft type	\varnothing 300...3183 mm (through hollow shaft)
Dimensions (sensor head)	165 x 25 x 93 mm
Axial tolerance	\pm 5 mm (belt to head)
Radial tolerance	1...3 mm (belt to head)
Protection DIN EN 60529	IP 67
Operating speed	\leq 1850 rpm (\varnothing 300 mm) \leq 150 rpm (\varnothing 1500 mm) see diagram below
Materials	Housing sensing head: aluminium alloy Magnetic belt: stainless steel (1.4104)
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

Speed dependent on the shaft diameter



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Part number

MQR3000F- [...] [.] [N] [] [.] [] [] [] [.] [A] []

Parity bit

None

/4802 Even

/4803 Odd

Operating temperature

A -40...+85 °C

Additional output

- 0 No additional output
- G 4096 pulses TTL, HTL (Vin=Vout), 4 channel
- H 4096 pulses TTL/RS422, 4 channel
- J 4096 sinewave cycles SinCos (1 Vpp), 4 channel
- 7 2048 pulses TTL, HTL (Vin=Vout), 4 channel
- 8 2048 pulses TTL/RS422, 4 channel
- 9 2048 sinewave cycles SinCos (1 Vpp), 4 channel
- 4 1024 pulses TTL, HTL (Vin=Vout), 4 channel
- 5 1024 pulses TTL/RS422, 4 channel
- 6 1024 sinewave cycles SinCos (1 Vpp), 4 channel

Resolution speed

- 00 No speed signal
- SE 12 bit, ± 20 rpm
- SF 12 bit, ± 40 rpm
- SG 12 bit, ± 500 rpm
- SH 12 bit, ± 2000 rpm
- SI 14 bit, ± 20 rpm
- SK 14 bit, ± 40 rpm
- SL 14 bit, ± 500 rpm
- SM 14 bit, ± 2000 rpm
- S2 16 bit, ± 40 rpm
- S3 16 bit, ± 500 rpm
- S4 16 bit, ± 2000 rpm
- S7 18 bit, ± 500 rpm
- S8 18 bit, ± 2000 rpm

Resolution singleturn

- 00 No position signal
- 13 13 bit
- 16 16 bit
- 20 20 bit

Voltage supply / interface

- UG 4,75...30 VDC, SSI Gray
- UB 4.75...30 VDC, SSI binary

Connection

- N Flange connector M23, tangential, 17-pin, male, CW

Shaft diameter (mm)

.... 0300...3183

Other versions on request.

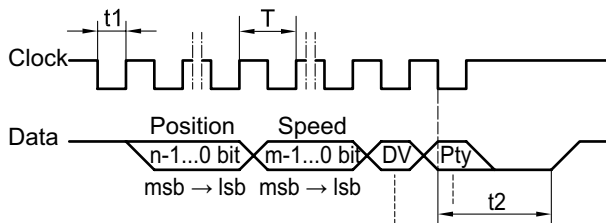
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Data transfer



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 μ s

Time lag (t1) 0,25...5 μ s

Monoflop time (t2) 13 μ s (internal)

Master wait time (t2) 15 μ s (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} applies exclusively to the speed word and is set at the factory depending to the speed range and shaft diameter.

The filter cut-off frequency is calculated as follows:

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

Further filter cut-off frequency settings on request.

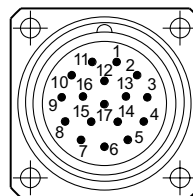
Terminal assignment

View A

Flange connector M23, 17-pin, male, CW

Pin	Assignment
1	System OK-
2	DIR direction of rotation (Adoption with HIGH)
3	Do not use
4	System OK+
5	Zero (Adoption at rising edge)
6	Do not use
7	+UB
8	SSI Clock+
9	SSI Clock-
10	0 V
11	Internal shield
12	B+ / Sin+ *
13	B- / Sin- *
14	SSI Data+
15	A+ / Cos+ *
16	A- / Cos- *
17	SSI Data-

* Do not use in version without incremental output



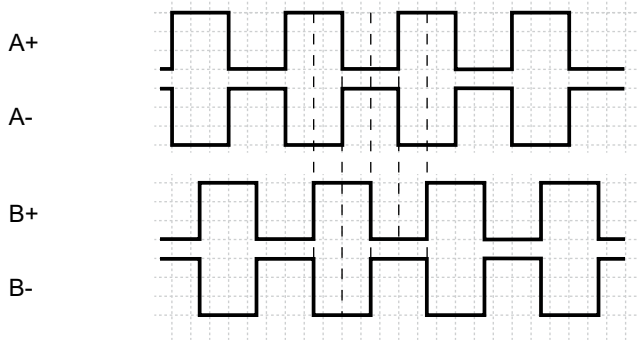
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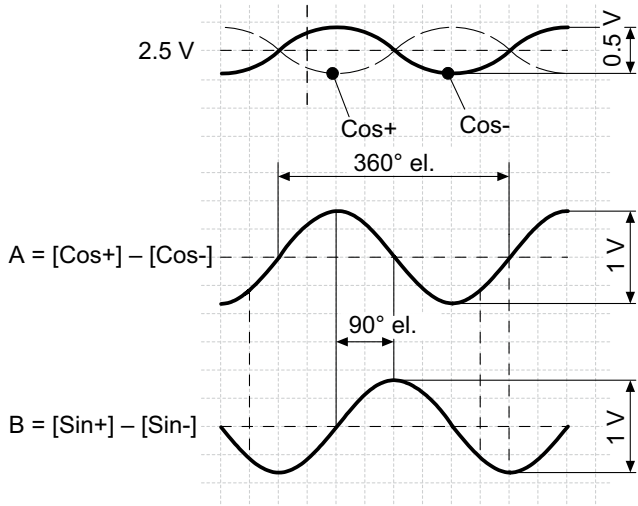
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Output signals

Version with additional square-wave signals HTL oder TTL at positive rotating direction



Version with additional SinCos signals at positive rotating direction



Accessories

Connectors and cables

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

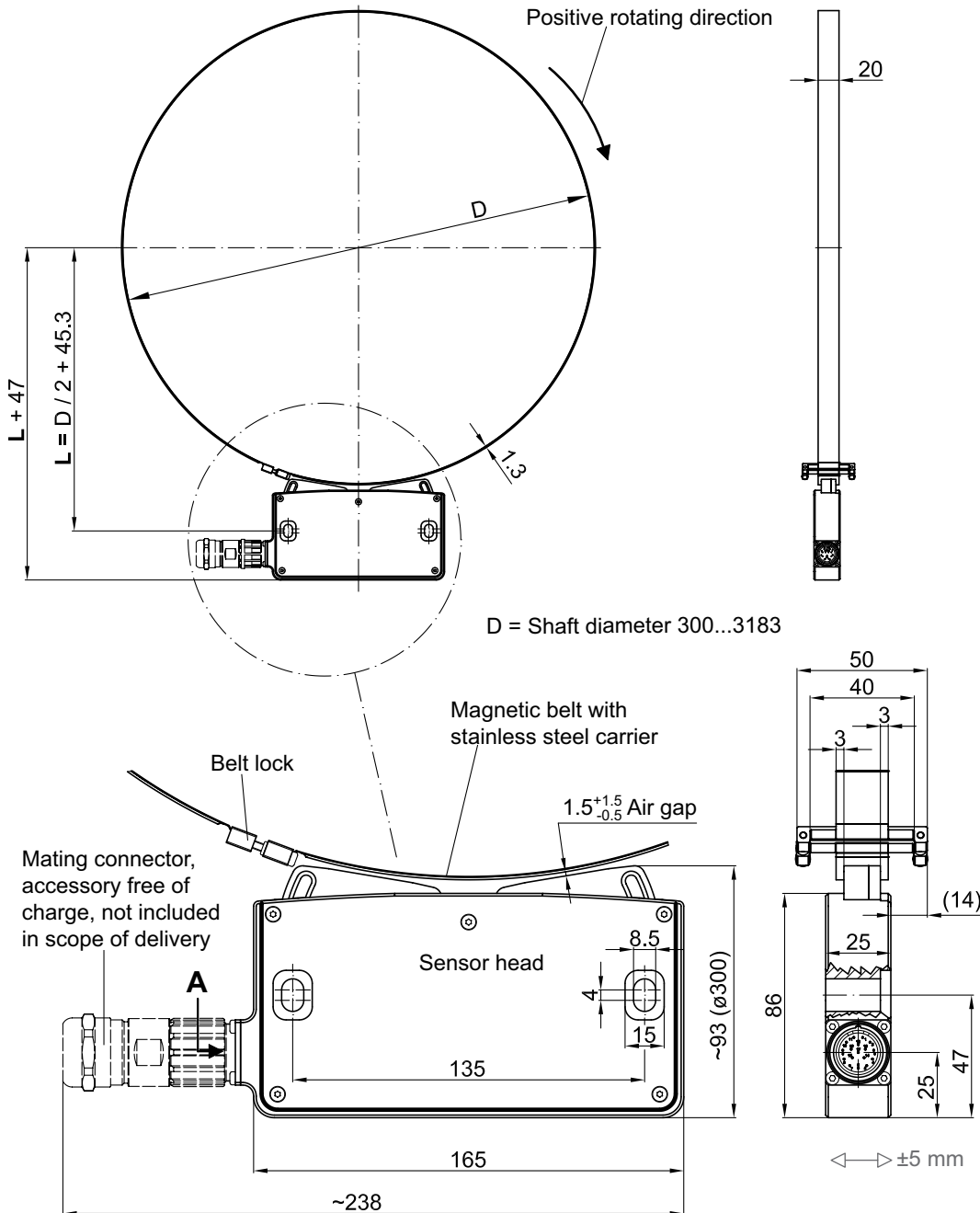
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Dimensions



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.