

# Encoders without bearings - absolute

## Sensor head with magnetic tape for shaft $\varnothing 300\text{...}3183$ mm

### Singleturn resolution up to 20 bit

#### MQR 3000F - HDmag flex



#### 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 ( $\pm 20\text{...}\pm 2000$ rpm)
Code	Gray or binary
Code sequence	Positiv at CW
Input signals	SSI clock, set zero, counting direction
Additional output signals	Square-wave HTL, TTL/RS422 or SinCos
Status indicator	Color-LED, system OK output
Interference immunity	EN 61000-6-2
Emitted interference	EN 61000-6-3
Approval	CE

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

Pulses per revolution	1024...4096
Phase shift	$90^\circ \pm 2^\circ$
Scan ratio	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 turn	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

#### Features

- "Quasi-absolute" (see page 4) 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

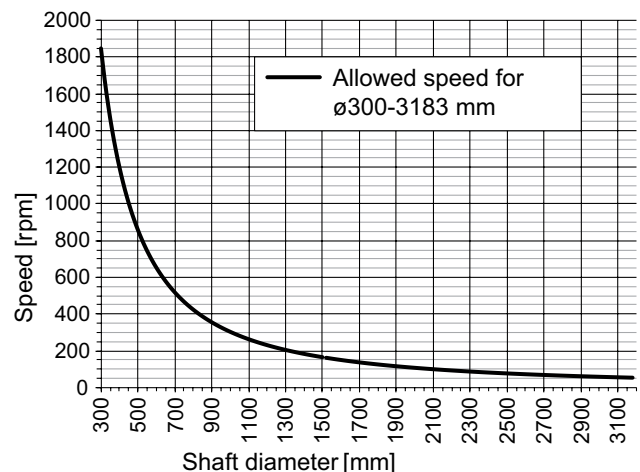
#### Optional

- Corrosion protection for offshore applications
- Additional incremental output
- Parity bit

#### Technical data - mechanical design

Dimensions (sensor head)	165 x 25 x 93 mm
Shaft type	$\varnothing 300\text{...}3183$ mm (through hollow shaft)
Axial tolerance	$\pm 5$ mm (belt to head)
Radial tolerance	1...3 mm (belt to head)
Protection DIN EN 60529	IP 67
Operating temperature	$-40\text{...}+85$ °C
Operating speed	1850 rpm ( $\varnothing 300$ mm) 150 rpm ( $\varnothing 1500$ mm) see diagram below
Resistance	IEC 60068-2-6 Vibration 30 g, 10-2000 Hz IEC 60068-2-27 Shock 300 g, 6 ms
Connection	Flange connector M23, 17-pin
Weight approx.	730 g (head), 120 g (belt/m), 17 g (lock)

#### 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,  $\pm$ 20 rpm

SF 12 bit,  $\pm$ 40 rpm

SG 12 bit,  $\pm$ 500 rpm

SH 12 bit,  $\pm$ 2000 rpm

SI 14 bit,  $\pm$ 20 rpm

SK 14 bit,  $\pm$ 40 rpm

SL 14 bit,  $\pm$ 500 rpm

SM 14 bit,  $\pm$ 2000 rpm

S2 16 bit,  $\pm$ 40 rpm

S3 16 bit,  $\pm$ 500 rpm

S4 16 bit,  $\pm$ 2000 rpm

S7 18 bit,  $\pm$ 500 rpm

S8 18 bit,  $\pm$ 2000 rpm

Resolution position 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 contacts, cw

Shaft diameter (mm)

.... 0300...3183

Other versions on request.

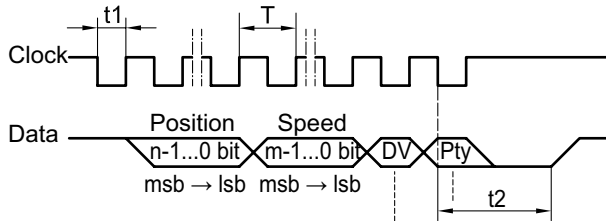
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##### Data transfer



##### 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 $\mu$ s
Time lag (t1)	0,25...5 $\mu$ s
Monoflop time (t2)	13 $\mu$ s (internal)
Master wait time (t2)	15 $\mu$ 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  $f_{\text{filter}}$  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.

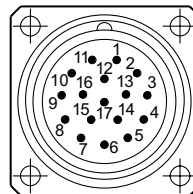
##### Terminal assignment

###### 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



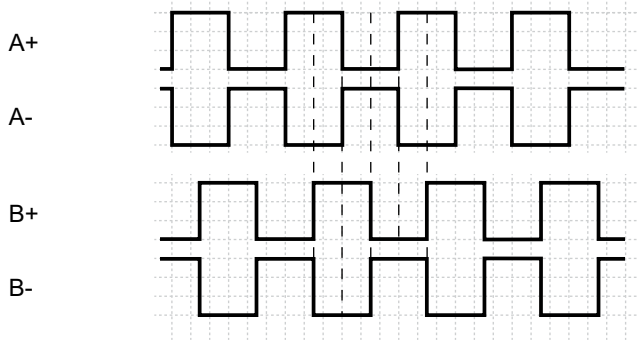
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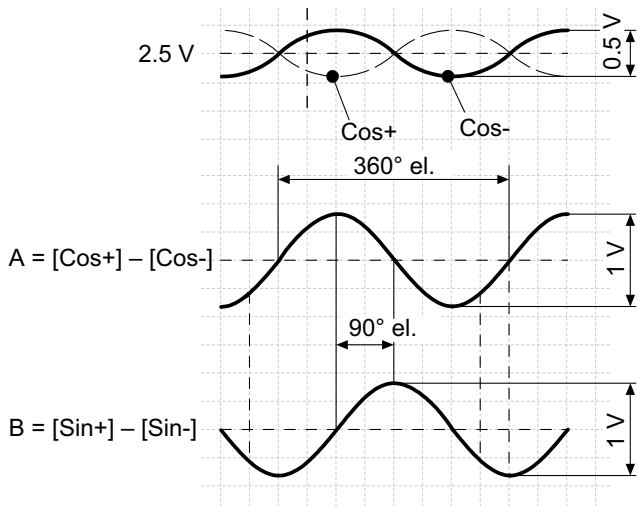
MQR 3000F - HDmag flex

## 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

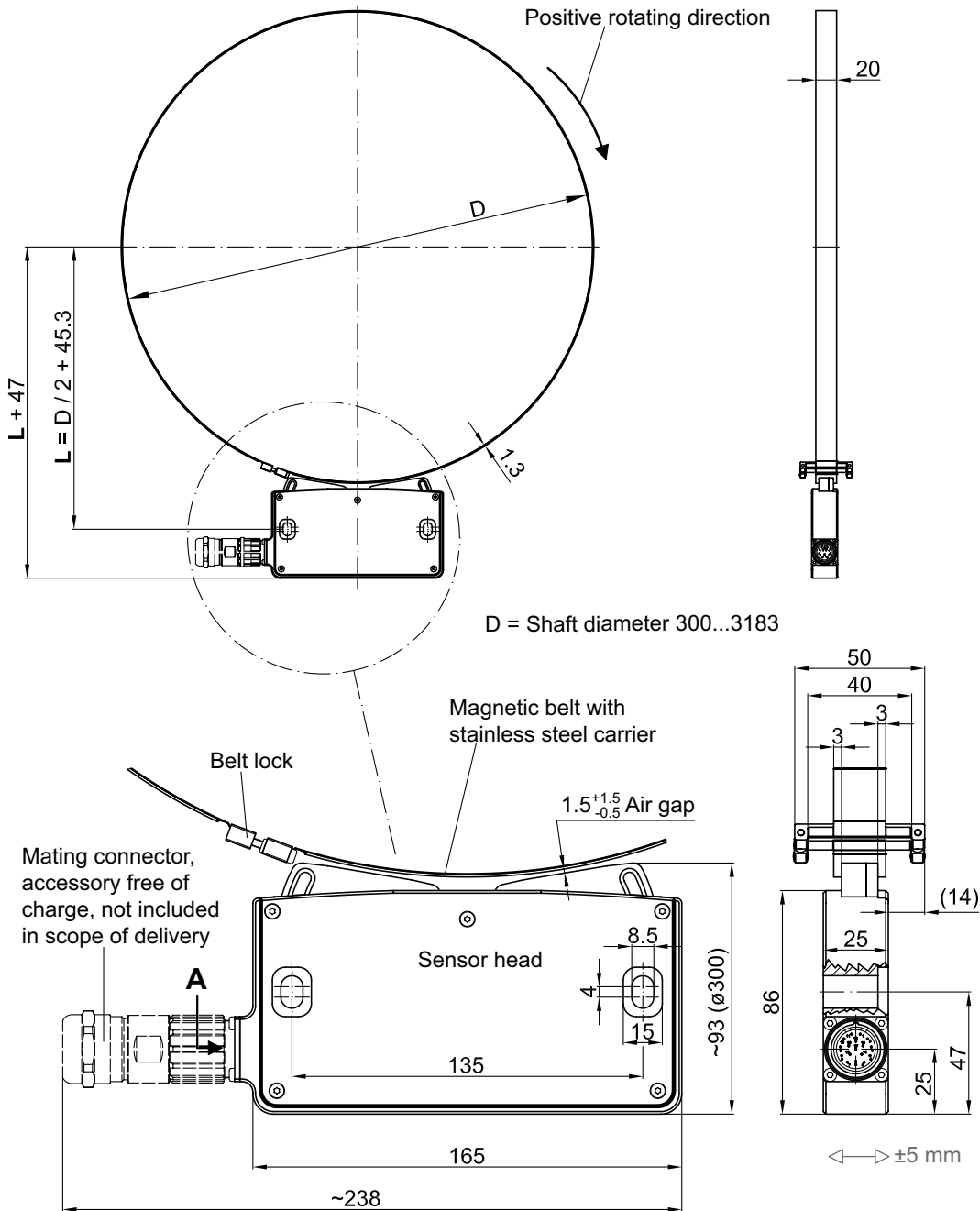
11068551 Mating connector M23, solder version, 17-pin, CCW

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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.