

# MHAP 100

Absolute encoder / Singleturn 8...17 Bit / Magnetic sensing / Through hollow shaft max.  $\varnothing 80$  mm  
 Additional 1...131072 pulses or 1...8192 sinewave cycles per turn

## Overview

- Absolute encoder with magnetic sensing and without bearings
- Sensor head with integrated FPGA signal processing
- Absolute resolution max. 17 bit singleturn
- Additional incremental output
- Robust and wearless
- Electronics is fully encapsulated
- High protection
- Large tolerances: axial  $0,3 \pm 0,2$  mm, radial max. 0.5 mm
- Simple mounting, easy adaptation
- Several mounting possibilities
- Magnetic rotor included in delivery



## Technical data

### Technical data - electrical ratings

Voltage supply	4.5...30 VDC
Consumption w/o load	$\leq 300$ mA
Sensing method	Magnetic
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	1 ... 131072
Phase shift	$90^\circ \pm 10^\circ$
Duty cycle	40...60 %
Output frequency	$\leq 2$ MHz
Output signals	A+, A-, B+, B-
Output stages	HTL TTL/RS422

### Technical data - electrical ratings (SinCos)

Sinewave cycles per revolution	1 ... 8192
Phase shift	$90^\circ \pm 5^\circ$
Output signals	A+, A-, B+, B-
Output stages	SinCos 1 Vpp
Difference of SinCos amplitude	$\leq 20$ mV
Harmonics typ.	-40 dB
DC offset	$\leq 20$ mV
Bandwidth	400 kHz (-3 dB)

### Technical data - electrical ratings (SSI)

Interface	SSI
Steps per revolution	$\leq 131072 / 17$ bit
Code	Gray or binary
Code sequence	CW default
Additional outputs	Square-wave TTL (RS422) Square-wave universal HTL/TTL SinCos

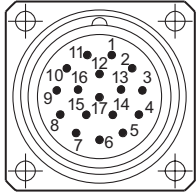
### Technical data - mechanical design

Sensor head	FPGA signal processing
Size (flange)	$\varnothing 101.3$ mm
Shaft type	$\varnothing 16...80$ mm (through hollow shaft)
Axial tolerance	$0.3 \pm 0.2$ mm (wheel/head)
Radial tolerance	$0.1...0.5$ mm (wheel/head)
Protection EN 60529	IP 67
Operating speed	$\leq 8000$ rpm
Material	Housing sensing head: aluminium alloy Wheel: stainless steel (1.4104)
Operating temperature	$-20...+85^\circ\text{C}$
Resistance	IEC 60068-2-6 Vibration 30 g, 55-2000 Hz IEC 60068-2-27 Shock 300 g, 2 ms
Accuracy of magnetic measure	$\pm 400''$
Connection	Flange connector M23, 17-pin

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## Terminal assignment



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

Pin	Assignment
1	dnu
2	dnu
3	dnu
4	dnu
5	dnu
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

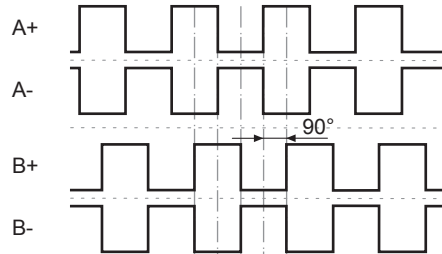
## Terminal significance

+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
dnu	Do not use

## Output signals

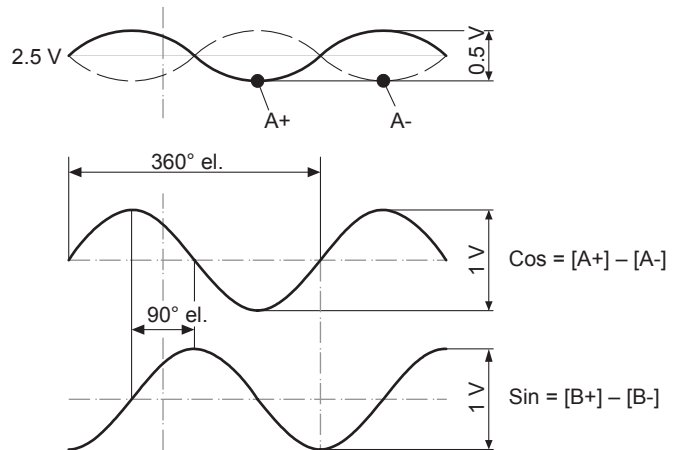
### Additional output HTL/TTL

At positive rotating direction (see dimension)



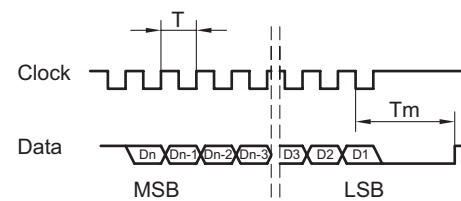
### Additional output SinCos

At positive rotating direction (see dimension)

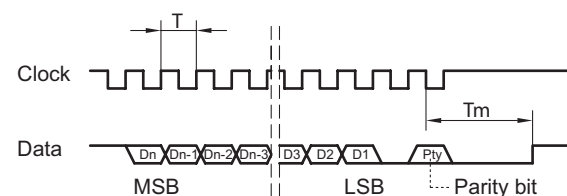


## Data transfer

### Without parity bit



### With parity bit



T = 0.5...10 μs

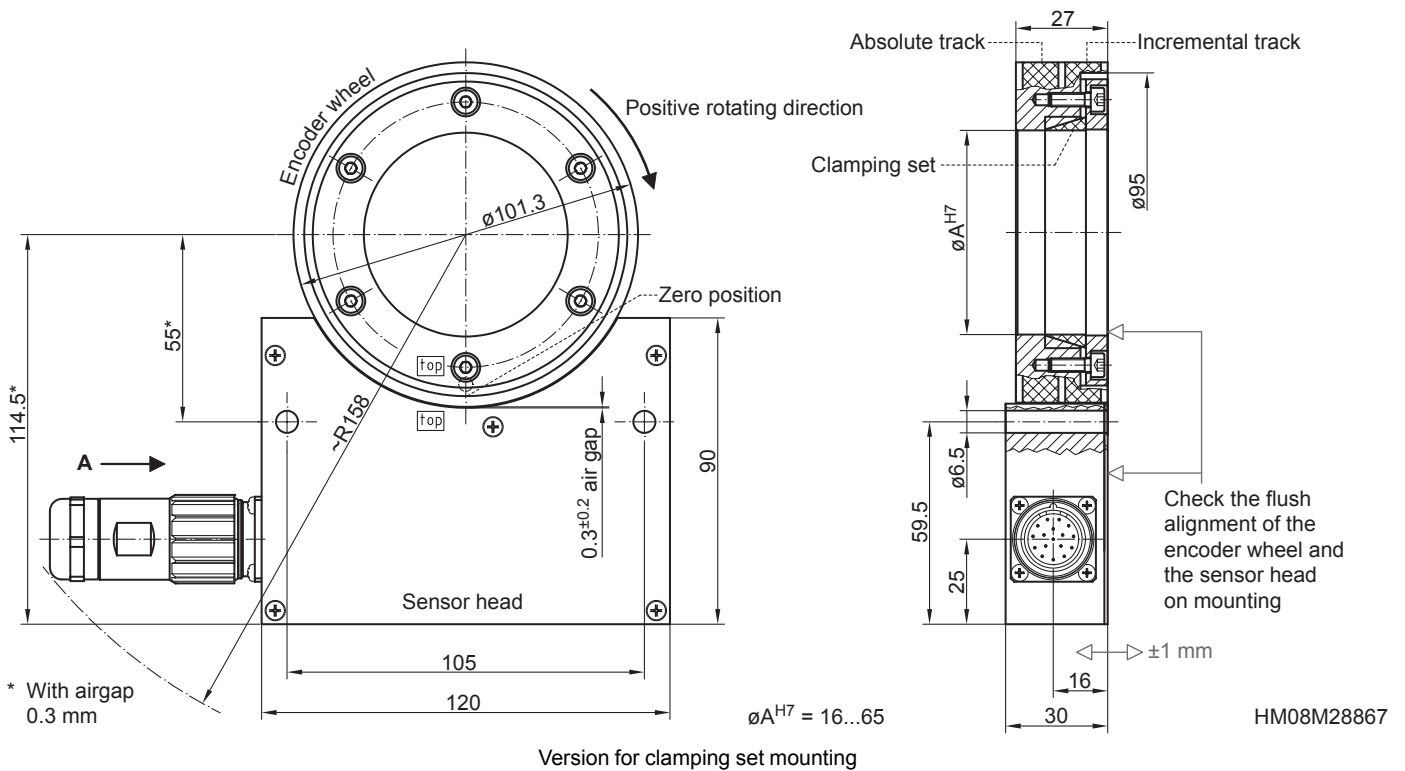
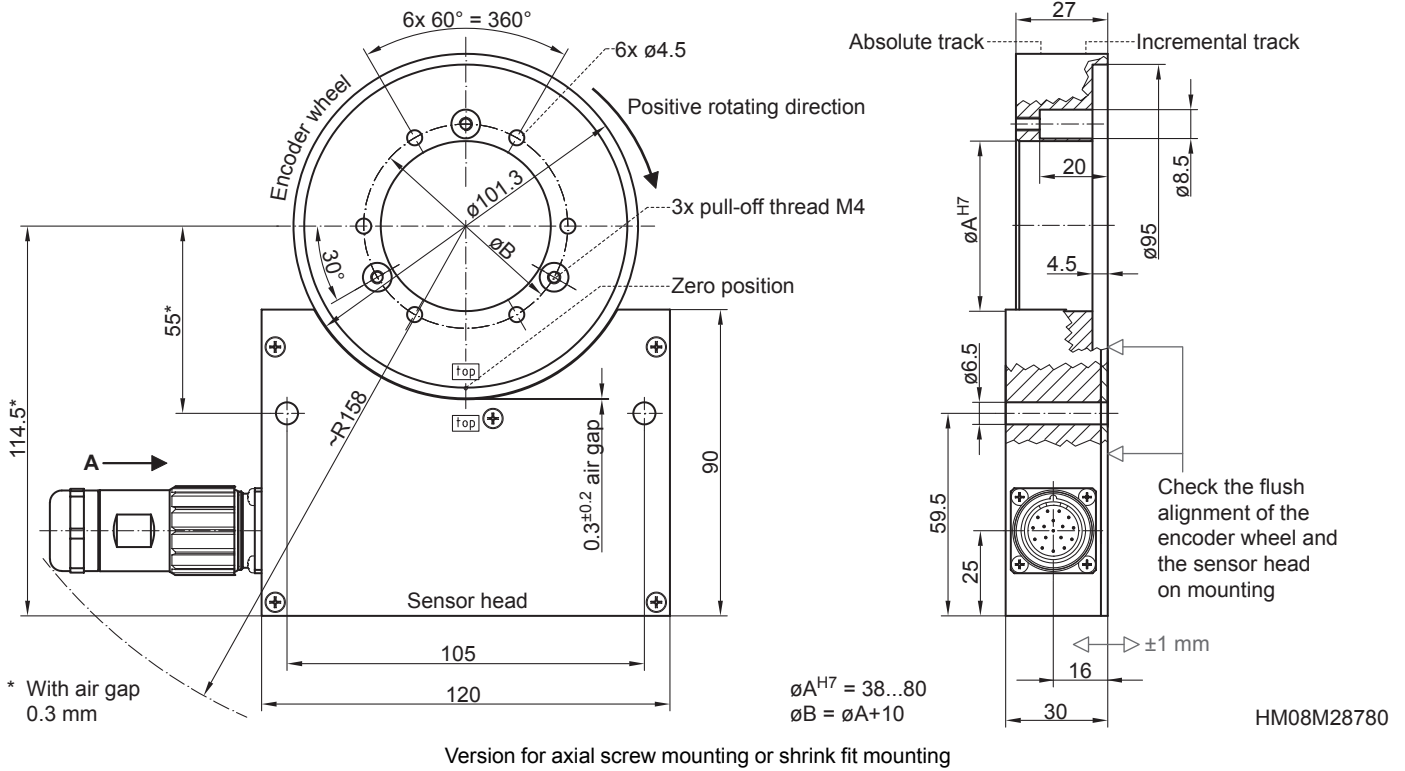
Tm = 15 μs

Clock frequency ≤2 MHz

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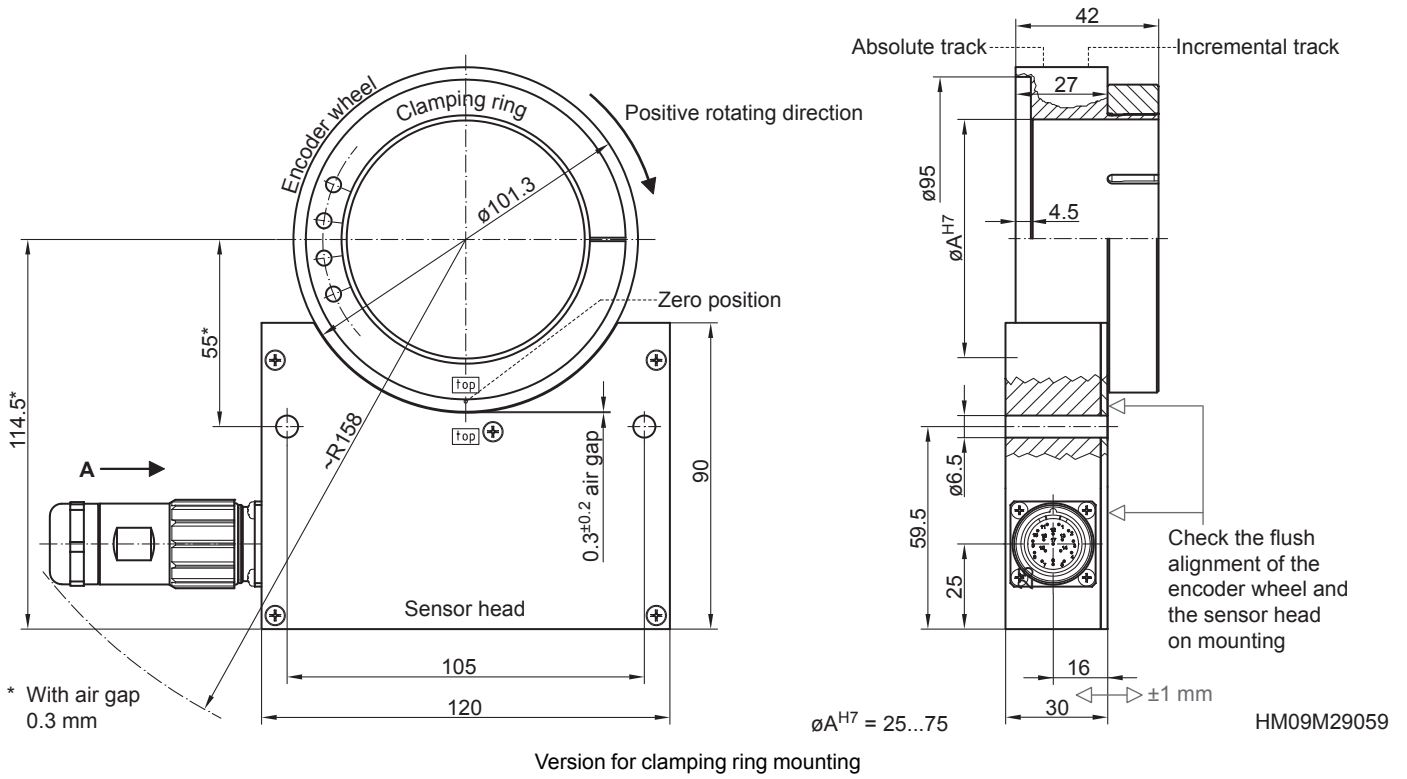
## Dimensions



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**Ordering reference**

	MHAP100	B	5	####	S	#	##	#	#	#####	D
<b>Product</b>	MHAP100										
Encoder without bearings - absolute	MHAP100										
<b>Bandaging</b>											
Encoder wheel standard bandage		B									
<b>Pole width</b>											
1 pole = 5 mm			5								
<b>Mounting type / hollow shaft (ø mm)<sup>(2)</sup></b>											
Screw or shrink fit mounting / ø38 mm										G38	
Screw or shrink fit mounting / ø60 mm										G60	
Screw or shrink fit mounting / ø80 mm										G80	
Clamping set mounting / ø16 mm										Z16	
Clamping set mounting / ø50 mm										Z50	
Clamping set mounting / ø65 mm										Z65	
Clamping ring mounting / ø25 mm										K25	
Clamping ring mounting / ø50 mm										K50	
Clamping ring mounting / ø75 mm										K75	
<b>Absolute share</b>											
SSI					S						
<b>Code</b>											
Binary code										B	
Gray code										G	
<b>Resolution Singleturn (bit)<sup>(2)</sup></b>											
13										13	
17										17	
<b>Parity bit</b>											
Odd										O	
Even										E	
None										N	
<b>Voltage supply / output stage (incremental output)</b>											
4.5...30 VDC / SinCos										P	
4.5...30 VDC / TTL										R	
5...30 VDC / 5 VDC = TTL, 10...30 VDC = HTL universal										U	
Without additional output signals										Z	
<b>Pulse number/sinewave cycles (incremental output)<sup>(2)</sup></b>											
Without additional output signals											0
64											64
128											128
256											256
512											512
1024											1024
2048											2048
4096											4096
8192											8192
16384 <sup>(1)</sup>											16384
131072 <sup>(1)</sup>											131072
<b>Connection</b>											
1x flange connector M23, tangential 17-pin, male, CW											D

(1) No SinCos output possible  
 (2) Other versions on request