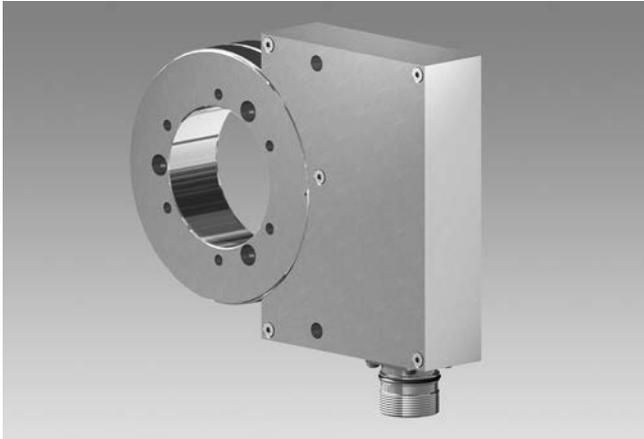# Encoders without bearings - absolute

Absolute encoder, sensor head with integrated FPGA signal processing

Magnetic sensing, through hollow shaft max. ø80 mm, singleturn 8...17 Bit

Additional 1…131072 pulses or 1...8192 sinewave cycles per turn

MHAP 100 - *HDmag*

MHAP 100 - Version for axial screw mounting

Features

– **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 ±1 mm, radial max. 0.5 mm**
– **Simple mounting, easy adaptation**
– **Several mounting possibilities**

Technical data - electrical ratings

Interference immunity	EN 61000-6-2
Emitted interference	EN 61000-6-3
Approvals	CE, UL approval / E217823

Technical data - electrical ratings (SSI)

Voltage supply	4.5...30 VDC
Interface	SSI
Function	Singleturn
Steps per turn	≤131072 / 17 bit
Sensing method	Magnetic
Code	Gray or binary
Code sequence	CW default
Additional outputs	Square-wave TTL (RS422) Square-wave universal HTL/TTL SinCos

Technical data - electrical ratings (square-wave)

Voltage supply	4.5...30 VDC
Consumption w/o load	≤300 mA
Pulses per revolution	1...131072
Phase shift	90° ±10°
Duty cycle	40...60 %
Sensing method	Magnetic
Output frequency	≤2 MHz
Output signals	A+, A-, B+, B-
Output stages	HTL TTL/RS422

Technical data - electrical ratings (SinCos)

Voltage supply	4.5...30 VDC
Consumption w/o load	≤300 mA
Sinewave cycles per turn	1...8192
Phase shift	90° ±5°
Sensing method	Magnetic
Output signals	A+, A-, B+, B-
Output stages	SinCos 1 Vpp
Difference of SinCos amplitude	≤20 mV
Harmonics typ.	-40 dB
DC offset	≤20 mV
Bandwidth	400 kHz (-3 dB)

Technical data - mechanical design

Sensor head	FPGA signal processing
Size (flange)	ø101.3 mm
Shaft type	ø16...80 mm (through hollow shaft)
Axial tolerance	±1 mm (wheel/head)
Radial tolerance	0.1...0.5 mm (wheel/head)
Protection DIN EN 60529	IP 67 (head), IP 68 (wheel)
Operating speed	≤8000 rpm
Operating temperature	-20...+85 °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	±400 ″
Connection	Flange connector M23, 17-pin

Encoders without bearings - absolute
Absolute encoder, sensor head with integrated FPGA signal processing
Magnetic sensing, through hollow shaft max. ø80 mm, singleturn 8...17 Bit
Additional 1…131072 pulses or 1...8192 sinewave cycles per turn

---

Part number

MHAP 100 B5 ☐ S ☐ ☐ ☐ ☐ ☐ D

Pulse number/sinewave cycles - see table

Voltage supply / signals
P   4.5...30 VDC / SinCos
R   4.5...30 VDC / square-wave (TTL)
U   5...30 VDC / square-wave (5 VDC = TTL / 10...30 VDC = HTL universal)
Z   Without additional output signals

Parity bit
O   Odd
E   Even
N   None

Resolution Singleturn (bit)
8, 9, 10, 11, 12, 13, 14, 15, 16, 17

Code
B   Binary code
G   Gray code

Mounting type / hollow shaft (ø mm)
Screw or shrink fit mounting
G38, G45, G50, G55, G60, G65, G70, G75, G80

Clamping set mounting
Z16, Z20, Z22, Z25, Z28, Z32, Z35, Z38, Z40, Z42, Z45, Z48, Z50, Z55, Z60, Z63, Z65

Clamping ring mounting
K25, K30, K32, K38, K40, K45, K48, K50, K55, K56, K60, K65, K70, K75

Pulse number/sinewave cycles

1	16	256	4096	65536
2	32	512	8192	131072
4	64	1024	16384	
8	128	2048	32768	

Maximum sinewave cycles 8192 for SinCos output.

Encoders without bearings - absolute
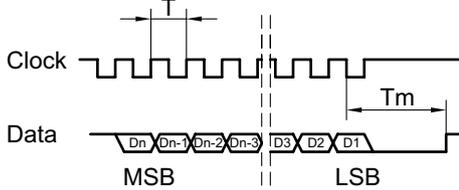## Absolute encoder, sensor head with integrated FPGA signal processing
Magnetic sensing, through hollow shaft max. ø80 mm, singleturn 8...17 Bit
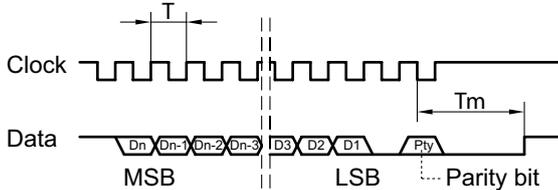## Additional 1…131072 pulses or 1...8192 sinewave cycles per turn

MHAP 100 - *HDmag*

Data transfer

Without parity bit
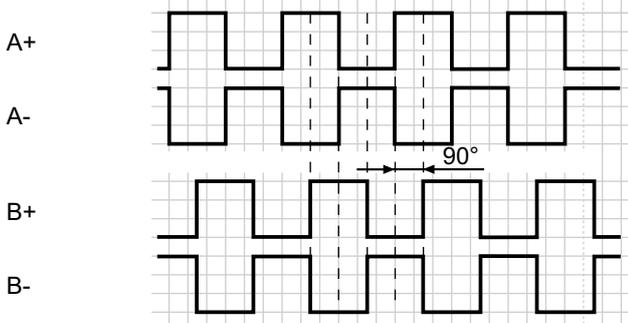

MSB ⟷ LSB

With parity bit

MSB ⟷ LSB · · · Parity bit

T	=	0.5 ... 10 µs
Tm	=	15 µs

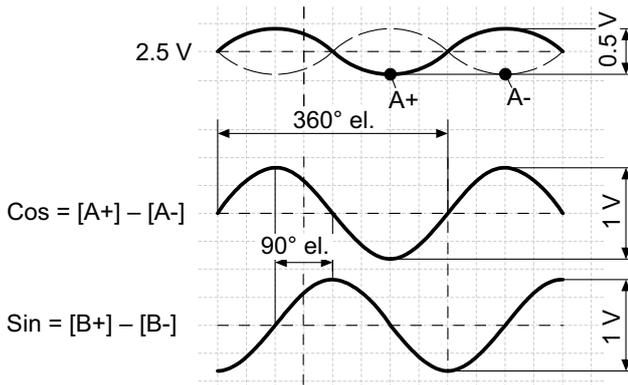|	
Taktfrequenz	≤2 MHz

Output signals

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

A+

A-

B+

B-

90°

Version with additional SinCos signals
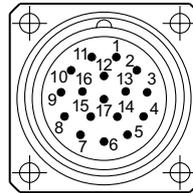at positive rotating direction

2.5 V   0.5 V

A+   A-

360° el.

Cos = [A+] – [A-]   1 V

90° el.

Sin = [B+] – [B-]   1 V

Terminal assignment

View A
Flange connector M23, 17-pin, male, CW

Pin	Assignment
1	Do not use
2	Do not use
3	Do not use
4	Do not use
5	Do not use
6	Do not use
7	+UB
8	SSI Clock+
9	SSI Clock-
10	⊥
11	Internal shield
12	B+ *
13	B- *
14	SSI Data+
15	A+ *
16	A- *
17	SSI Data-

* Do not use in version without incremental output

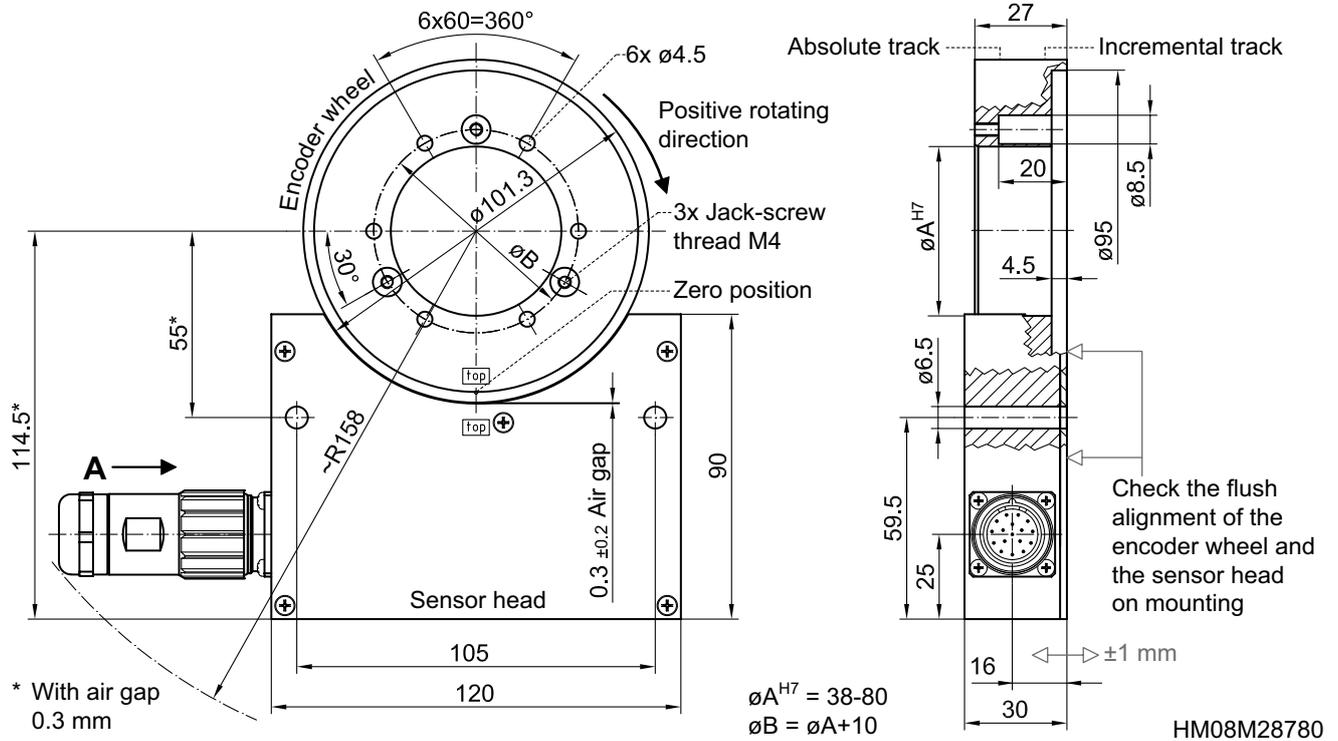Baumer   www.baumer.com/motion

Encoders without bearings - absolute
Absolute encoder, sensor head with integrated FPGA signal processing
Magnetic sensing, through hollow shaft max. ø80 mm, singleturn 8...17 Bit
Additional 1…131072 pulses or 1...8192 sinewave cycles per turn

MHAP 100 - *HDmag*

Dimensions

Version for axial screw mounting or shrink fit mounting

6x60=360°
Encoder wheel
6x ø4.5
Positive rotating direction
ø101.3
30°
øB
3x Jack-screw thread M4
Zero position
55*
114.5*
~R158
A
90
0.3 ±0.2 Air gap
Sensor head
105
120
* With air gap 0.3 mm

27
Absolute track
Incremental track
20
ø8.5
$øA^{H7}$
ø95
4.5
ø6.5
Check the flush alignment of the encoder wheel and the sensor head on mounting
59.5
25
16
±1 mm
30

$øA^{H7}$ = 38-80
øB = øA+10

HM08M28780

Version for clamping set mounting

Encoder wheel
ø101.3
Positive rotating direction
Zero position
55*
114.5*
~R158
A
90
0.3 ±0.2 Air gap
Sensor head
105
120
* With air gap 0.3 mm

27
Absolute track
Incremental track
Clamping set
ø95
$øA^{H7}$
ø6.5
Check the flush alignment of the encoder wheel and the sensor head on mounting
59.5
25
16
±1 mm
30

$øA^{H7}$ = 16-65

HM08M28867

Encoders without bearings - absolute

Absolute encoder, sensor head with integrated FPGA signal processing
Magnetic sensing, through hollow shaft max. ø80 mm, singleturn 8...17 Bit
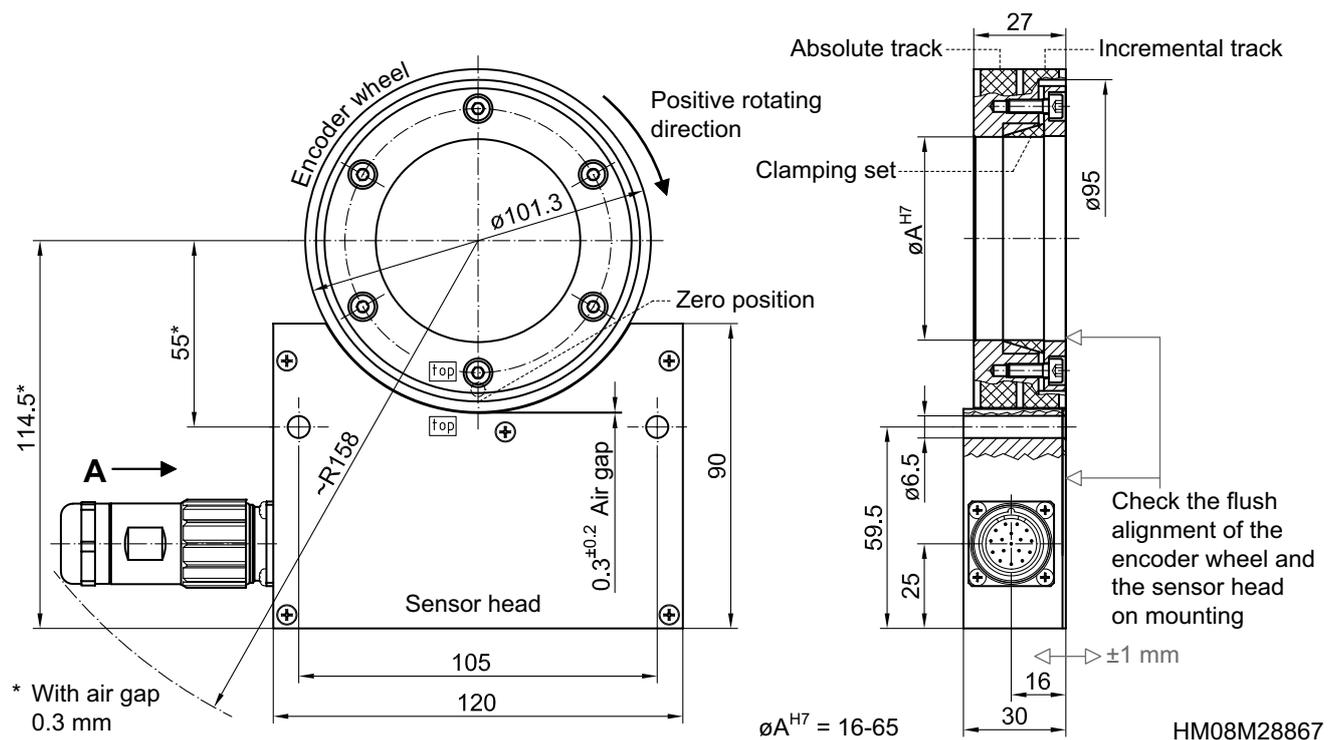**Additional 1…131072 pulses or 1...8192 sinewave cycles per turn**

MHAP 100 - *HDmag*

Dimensions

Version for clamping ring mounting

* With air gap 0.3 mm

øA^{H7} = 25-75

HM09M29059

Baumer