

## High resolution absolute single-turn rotary encoder Model HBE

Document no.: HBE 13321 EE

Date: 13.01.2016



- Robust design for rough applications with high resolution requirement such as crane technology, construction machines and special engineering
- High vibration and shock resistance thanks to the compact mechanical design
- Resolution < 22 bit/360°
- Protection type IP 66



### Design

- Robust housing (wall thickness 5 mm) manufactured from seawater-proof aluminium (AlMgSi1) or stainless steel (material: 1.4305 optionally 1.4404) - stainless steel shaft and ball bearing - magnetic based sensor system.
- Supply voltage with transient filtering, output driver unit forms the electrical interface SSI.
- Electrical connection via M12X1 connector, pin, 8-pin, A-coded

### Function

The absolute angle information derived by the encoder is converted into serial information by an internal parallel-serial converter and then transmitted to a receiving electronic circuit in synchronism with a clock.

Important advantages are : Low number of data lines and high reliability.

An exhaustive description is contained in TWK's [SSI 10630](#) pamphlet.

**High resolution  
absolute single-turn rotary encoder  
Model HBE**

**Technical data**

**Electrical data**

- Operating voltage: 9 to 36 VDC (protected against polarity reversal)
- Power consumption: < 1.8 W
- Resolution: 16 bit (for higher resolution, please contact our technical staff)
- Code path: CW\* or CCW\*\* can be set
- Reference value: 0 to (total number of steps -1)
- Accuracy:  $\leq \pm 0.05\%$  (with reference to 360°)
- Reproducibility:  $\leq \pm 0.01\%$  (with reference to 360°)
- Temperature drift: < 0.1 % (with reference to 360° over the entire temperature range)
- SSI- interface: Regarding [SSI10630](#) (TWK)
- Serial output SSI: Differential data output (RS 422)
- Clock input SSI: Differential data input (RS 422)
- Monoflop time:  $16 \pm 10 \mu\text{s}$  (standard)
- Clock rate: Max. 1 MHz
- Connecting cable: Use twisted pair cable with shield e.g. LiyCY 4x2x0.14 mm<sup>2</sup>, shielded

**Mechanical data**

- Operating speed: 500 rpm
- Angular acceleration:  $10^5 \text{ rad/s}^2$  max.
- Moment of inertia (rotor): 20 gcm<sup>2</sup>
- Operating torque:  $\leq 2 \text{ Ncm}$
- Starting torque:  $\leq 3 \text{ Ncm}$
- Perm. shaft load: 250 N axially, 250 N radially
- Bearing service life:  $\geq 10^9$  revolutions \*\*\*
- Weight: Aluminium approx. 0.4 kg,  
stainless steel approx. 0.6 kg

\*) CW = increasing signal clockwise viewed looking towards the shaft  
 \*\*) CCW = increasing signal counter-clockwise viewed looking towards the shaft  
 \*\*\*) This value applies at maximum shaft load.

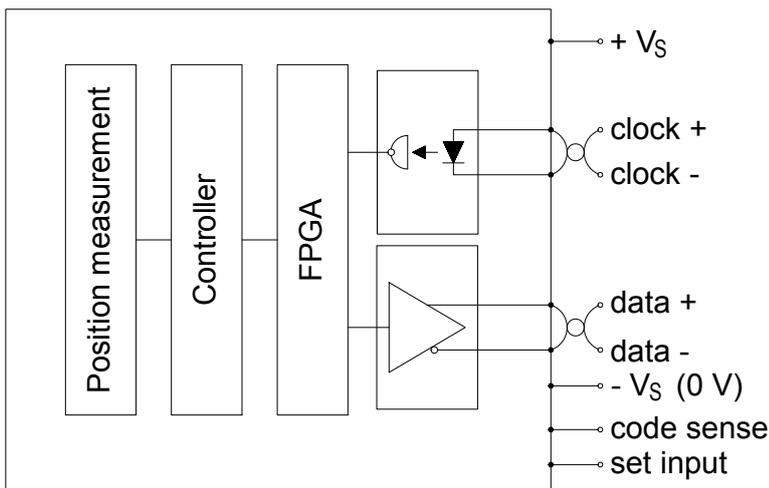
**High resolution  
absolute single-turn rotary encoder  
Model HBE**

Technical data

**Environmental data**

- Operating temperature range: - 40 °C to + 85 °C
- Storage temperature range: - 40 °C to + 100 °C (without packaging)
- Resistance
  - To shock: 250 m/s<sup>2</sup>; 6 ms  
DIN EN 60068-2-27
  - To vibration: 200 m/s<sup>2</sup>; 10 Hz ... 2000 Hz  
DIN EN 60068-2-6
- EMC standards: DIN EN 61 000 - 6 - 2 Immision (burst/ESD/etc.)  
DIN EN 61 000 - 6 - 4 Emission
- Protection type (DIN EN 60529): IP 66  
(For higher protection types up to IP 69K, please contact our technical staff)

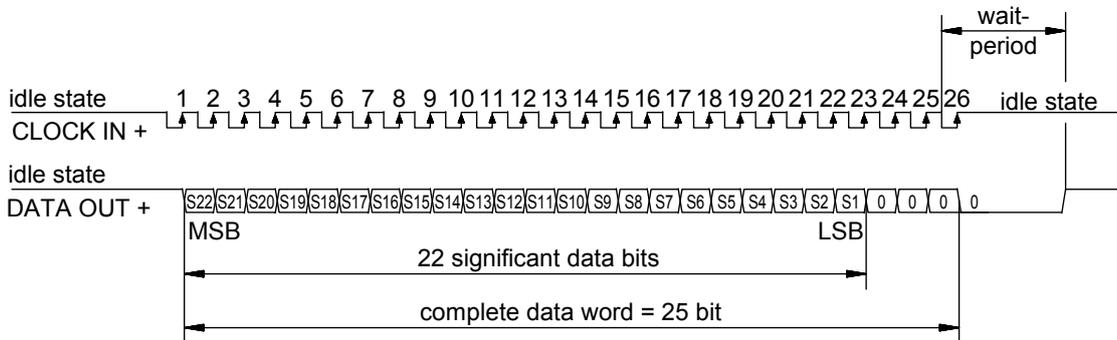
Principle circuit diagram



**High resolution  
absolute single-turn rotary encoder  
Model HBE**

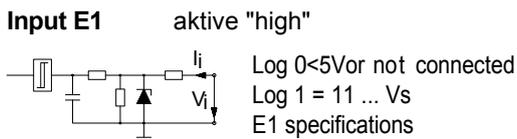
**Data format**

**Interface profile SSI - 25 Bit**



**Input circuit E1**

Input circuit for setting the reference value and for setting of the Code sense CW/CCW of the encoder.



**High resolution  
absolute single-turn rotary encoder  
Model HBE**

**Electrical connections, mating connector**

**Electrical connection**

- Connector M12x1, pin, 8-pin, A-coded
- Refer to the tables below for the connection assignments; these are also enclosed with the devices.

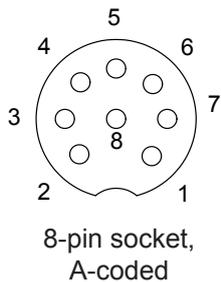
**Mating connectors (to be ordered separately)**

All of the mating connectors listed in the following table are M12X1, 8-pin, A-coded, with screw clamp connection, with protection type IP 67, with screening on the housing and the maximum connection cross-section is 0.5 mm<sup>2</sup>.

Order number	Contact design	Connector design	Housing material	Cable Ø (mm)
STK8GS54	Socket	Straight	Nickel-plated brass	6 - 8
STK8WS86	Socket	Angled	Nickel-plated brass	6 -8
STK8GS105	Socket	Straight	Stainless steel	5.5 – 8.6

Please note: if angled mating connectors are used, please notify us so that the device connectors can be aligned accordingly.

**Mating connector M12x1 pin diagrams (view of insertion side)**



**Pin connection assignment**

Contact No.	Assigned with
1	+ Vs = 9 ... 36 V / I <sub>o</sub> >90 mA (typ. I <sub>o</sub> = 70 mA)
2	- Vs = 0 VDC
3	Clock in+ differential-clock input (opto-coupler) for peripheral driver acc. to specification of RS 422
4	Clock in- differential-data driver according to specification of RS 422 standard
5	Data out+
6	Data out -
7	SET input (input circuit E1) - Set zero point SET inactivated at Vi = Log 0 or not connected SET activated at Vi = Log 1
8	Code sense CW at Vi = Log 0 or not connected CCW at Vi = Log 1

**High resolution  
absolute single-turn rotary encoder  
Model HBE**

Order number

HBE	58	-	K	A	65,536	R	S	E	01
-----	----	---	---	---	--------	---	---	---	----

Electrical and mechanical variants\*  
01 Standard

Output:

E SSI

Electrical connection:

S M12 connector (bus in/bus out)

Kx Cable, x=length in m

Output code

R Binary code

Resolution:

1 to 4,063,232 steps / 360°

Housing material:

A Aluminium

S Stainless steel

Flange type:

58 **K Clamped flange, shaft 10 mm with flattened area**

KF Clamped flange, shaft 10 mm with woodruff key

KP Clamped flange, shaft 10 mm with feather key

KZ Clamped flange, shaft for measurement gear ZRS

S Synchro flange, shaft 6 mm

ST Synchro flange, shaft 6 mm with flattened area

SR Synchro flange, clamped shaft for 12 mm (torque support, see accessories)

SN Synchro flange, clamped shaft for 12 mm with groove for feather key (torque support, see accessories)

65 S Synchro flange, shaft 12 mm

Design form

Model:

HBE With SSI interface  
and are documented in the factory.

**Accessories (to be ordered separately)**

- Fastening clamps for sensor assembly  
**KL 66-2-S** See data sheet [MZ 10111](#)
- Play-free clamping coupling for shaft connection  
**KK14N** With groove for feather key according to DIN 6885 sheet 1 – JS9, see data sheet [KK 12301](#)
- Torque support/stator coupling for shaft offset compensation between the rotary encoder and drive  
**ZMS58** Manufactured from permanently elastic plastic, see data sheet [ZMS 12939](#)
- Please refer to the table on page 5 for the mating connector order numbers.

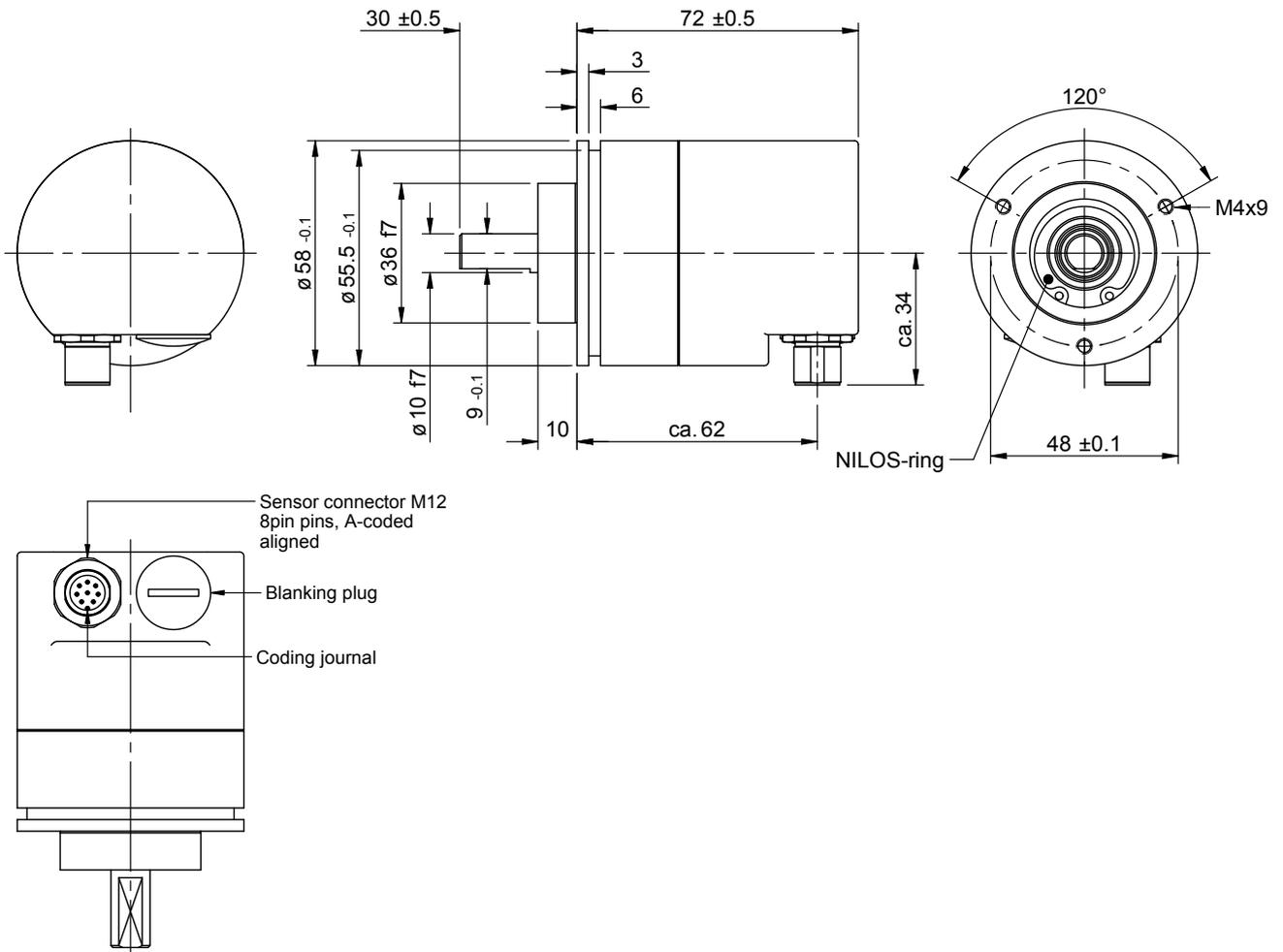
**High resolution  
absolute single-turn rotary encoder  
Model HBE**

**Installation drawing**

**Standard design form:** clamped flange and shaft  $\varnothing$  10 mm with glattened area

**Order number:** **HBE58 - KA 65536 R S E01 (see drawing)**

**Dimensions in mm**





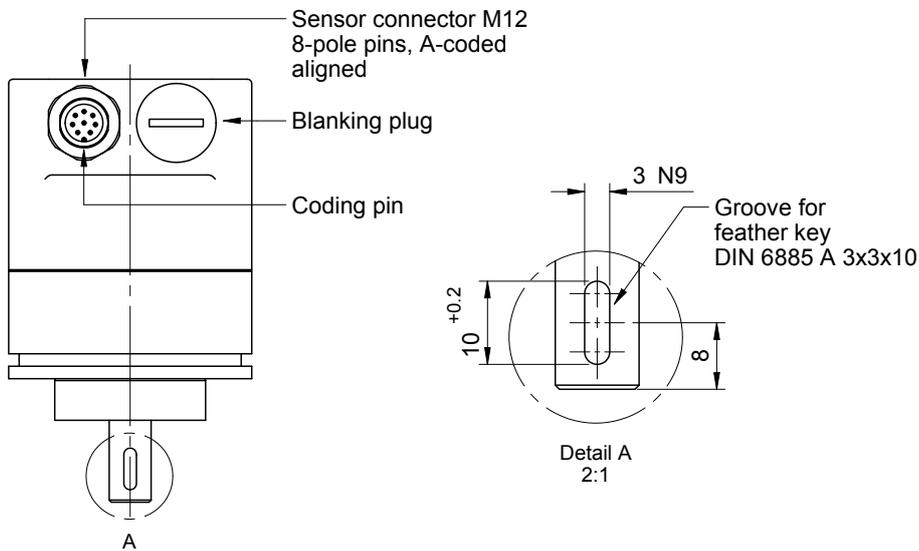
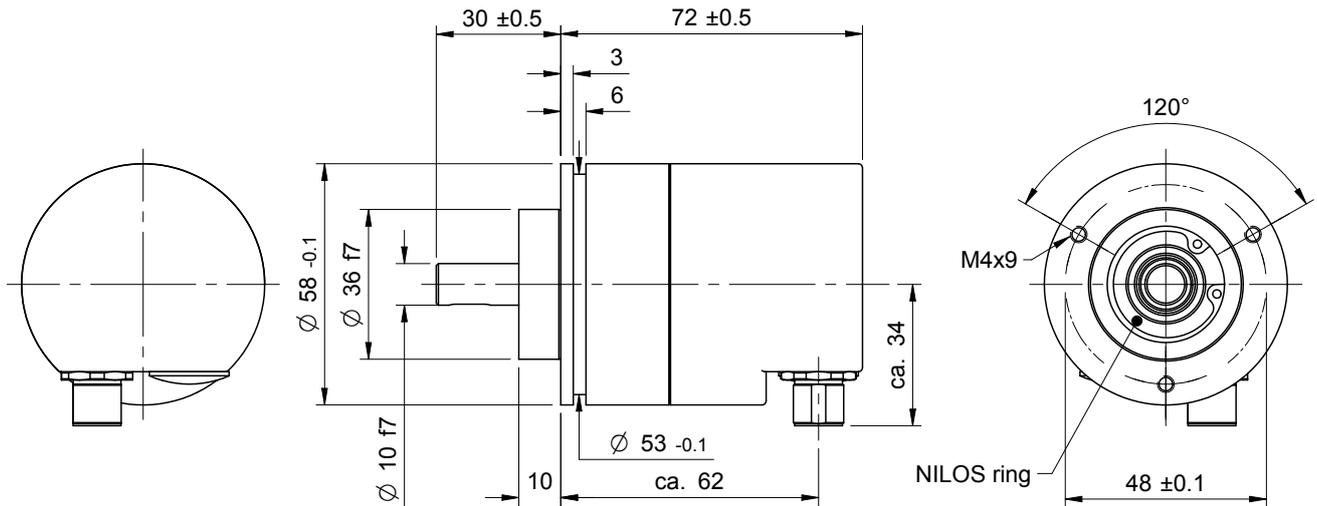
**High resolution  
absolute single-turn rotary encoder  
Model HBE**

**Installation drawing**

**Further possible design form:** clamped flange, shaft 10 mm with feather key

**Order number:** **HBE58 - KPA 65,536 R S E01**

**Dimensions in mm**





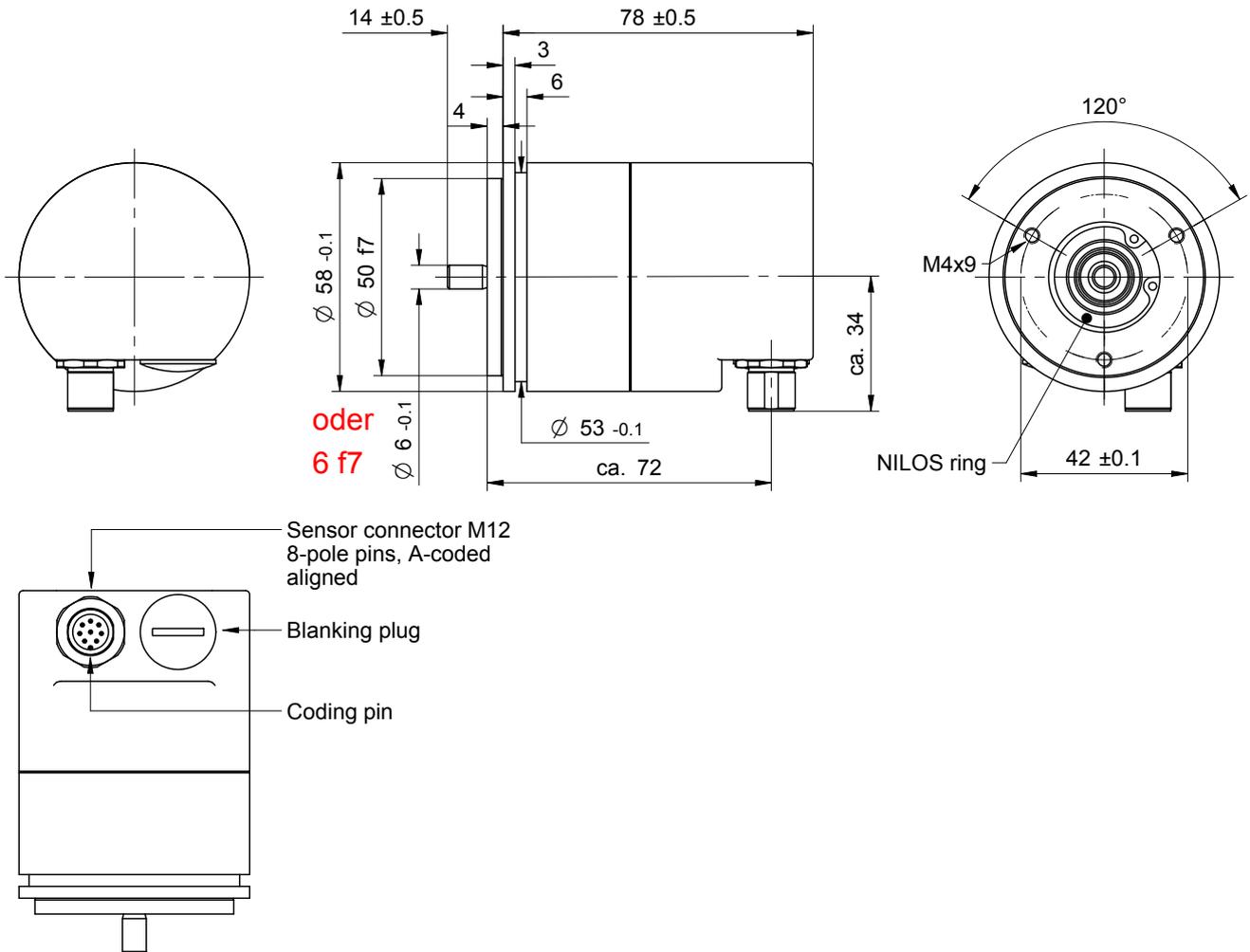
**High resolution  
absolute single-turn rotary encoder  
Model HBE**

**Installation drawing**

**Further possible design form:** synchro flange, shaft 6 mm with flattened area

**Order number:** **HBE58 - STA 65,536 R S E01**

**Dimensions in mm**



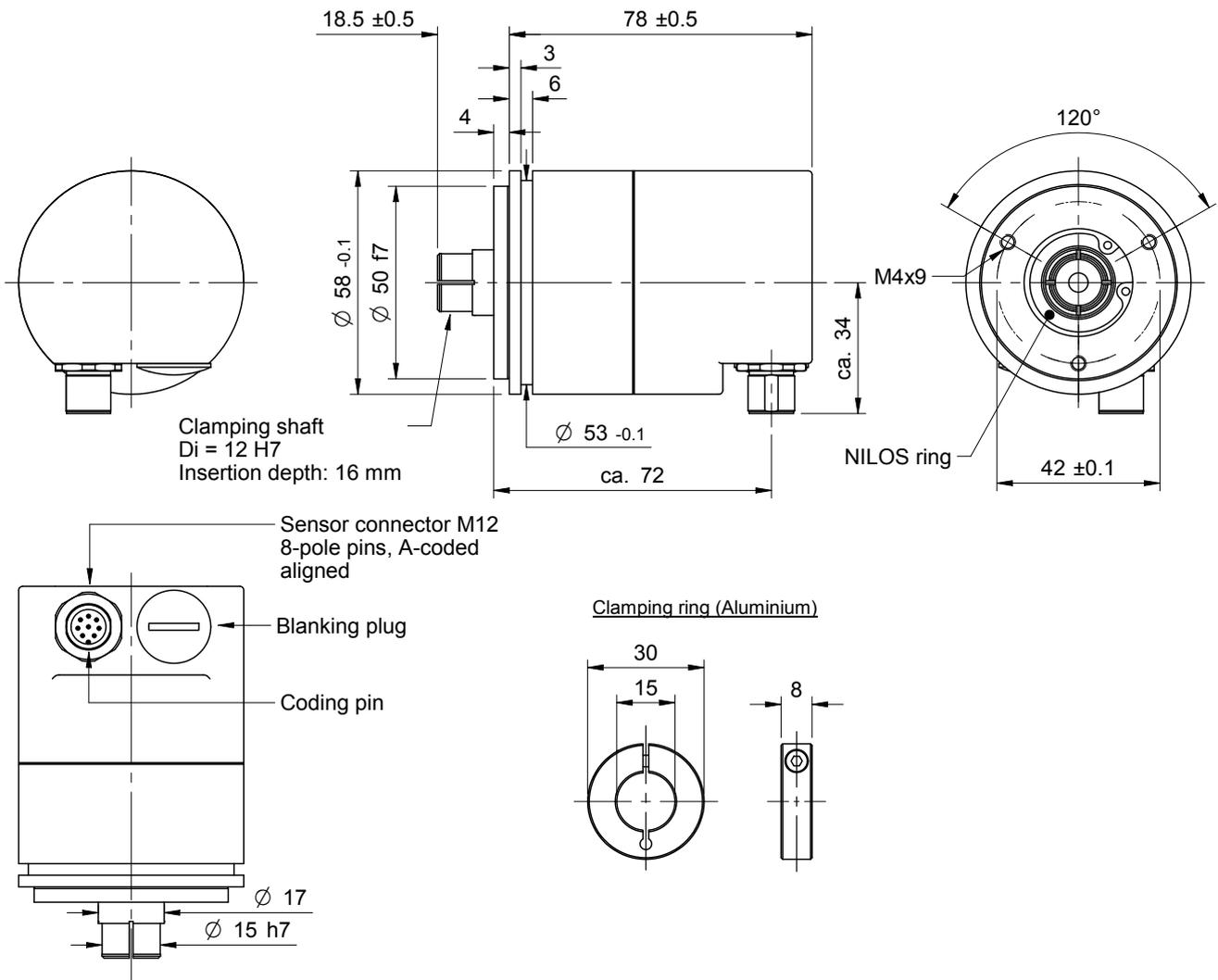
**High resolution  
absolute single-turn rotary encoder  
Model HBE**

**Installation drawing**

**Further possible design form:** synchro flange, clamped shaft for 12 mm (torque support, see accessories)

**Order number:** **HBE58 - SRA 65,536 R S E01**

**Dimensions in mm**



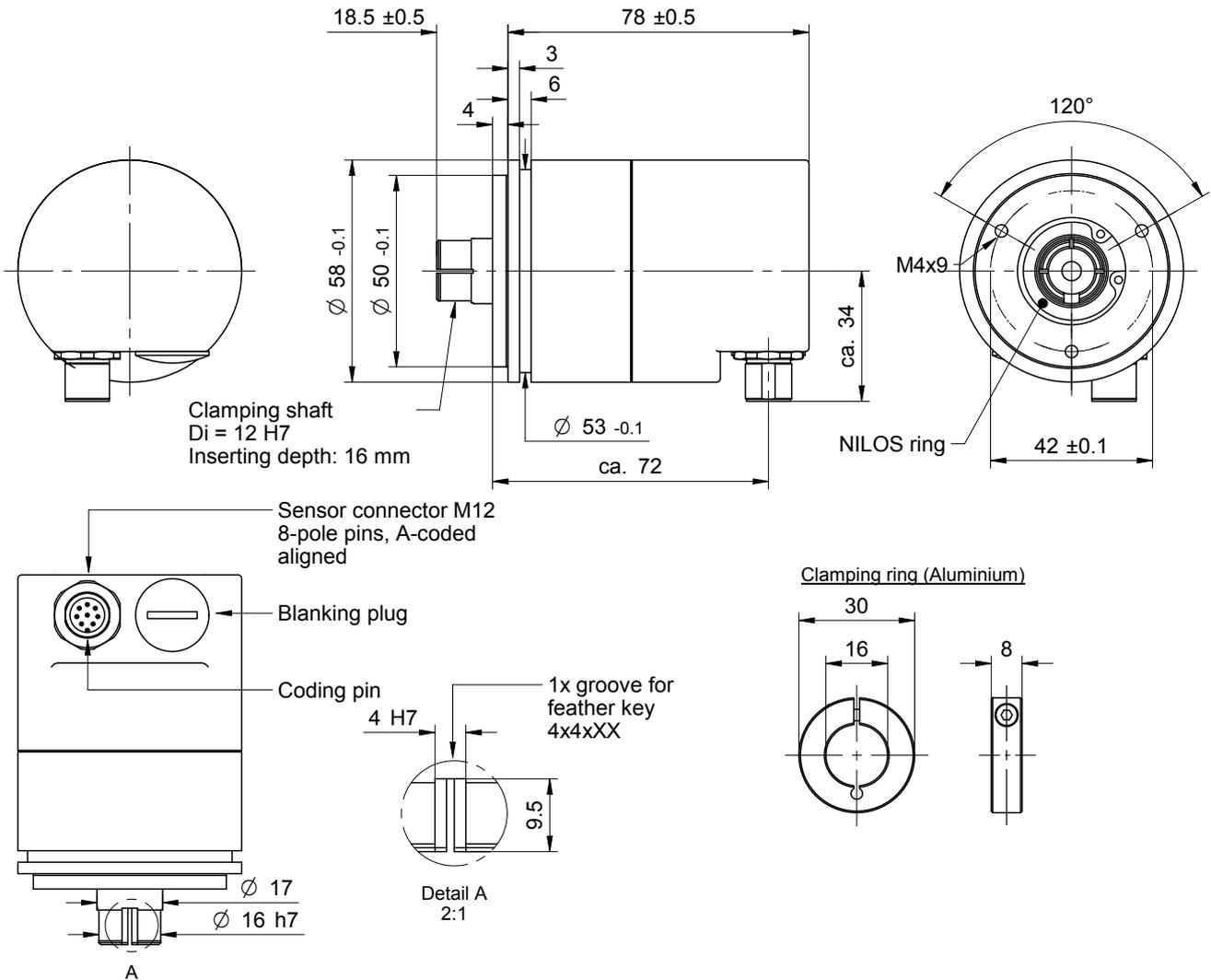
**High resolution  
absolute single-turn rotary encoder  
Model HBE**

**Installation drawing**

**Further possible design form:** synchro flange, clamped shaft for 12 mm with groove for feather key  
(torque support, see accessories)

**Order number:** **HBE58 - SNA 65,536 R S E01**

**Dimensions in mm**



**High resolution  
absolute single-turn rotary encoder  
Model HBE**

**Installation drawing**

**Further possible design form:** synchro flange, shaft 12 mm

**Order number:** **HBE65 - SA 65,536 R S E01**

**Dimensions in mm**

