High resolution absolute single-turn rotary encoder
Model HBE

**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](https://www.twk.de).

- 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
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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: ≤ ± 0.05 % (with reference to 360°)
- Reproducibility: ≤ ± 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 ±10 µs (standard)
- Clock rate: Max. 1 MHz
- Connecting cable: Use twisted pair cable with shield e.g. LiyCY 4x2x0.14 mm², shielded

Mechanical data

- Operating speed: 500 rpm
- Angular acceleration: 10⁵ rad/s² max.
- Moment of inertia (rotor): 20 gcm²
- Operating torque: ≤ 2 Ncm
- Starting torque: ≤ 3 Ncm
- Perm. shaft load: 250 N axially, 250 N radially
- Bearing service life: ≥ 10⁹ 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.
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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/s²; 6 ms
    DIN EN 60068-2-27
  - To vibration: 200 m/s²; 10 Hz ... 2000 Hz
    DIN EN 60068-2-6
- EMC standards:
  - DIN EN 61 000 - 6 - 2 Immission (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
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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.

Input E1 aktive "high"

Log 0 ≤ 5V or not connected
Log 1 = 11 ... Vs
E1 specifications
High resolution
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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 mm².

<table>
<thead>
<tr>
<th>Order number</th>
<th>Contact design</th>
<th>Connector design</th>
<th>Housing material</th>
<th>Cable Ø (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>STK8GS54</td>
<td>Socket</td>
<td>Straight</td>
<td>Nickel-plated brass</td>
<td>6 - 8</td>
</tr>
<tr>
<td>STK8WS86</td>
<td>Socket</td>
<td>Angled</td>
<td>Nickel-plated brass</td>
<td>6 - 8</td>
</tr>
<tr>
<td>STK8GS105</td>
<td>Socket</td>
<td>Straight</td>
<td>Stainless steel</td>
<td>5.5 – 8.6</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Contact No.</th>
<th>Assigned with</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+ Vs = 9 … 36 V / Io &gt;90 mA (typ. Io = 70 mA)</td>
</tr>
<tr>
<td>2</td>
<td>- Vs = 0 VDC</td>
</tr>
<tr>
<td>3</td>
<td>Clock in+ differential-clock input (opto-coupler) for peripheral driver acc. to specification of RS 422</td>
</tr>
<tr>
<td>4</td>
<td>Clock in- differential-data driver accordingto specification of RS 422 standard</td>
</tr>
<tr>
<td>5</td>
<td>Data out+</td>
</tr>
<tr>
<td>6</td>
<td>Data out -</td>
</tr>
<tr>
<td>7</td>
<td>SET input (input circuit E1) - Set zero point</td>
</tr>
<tr>
<td></td>
<td>SET inactivated at Vi = Log 0 or not connected</td>
</tr>
<tr>
<td></td>
<td>SET activated at Vi = Log 1</td>
</tr>
<tr>
<td>8</td>
<td>Code sense</td>
</tr>
<tr>
<td></td>
<td>CW at Vi = Log 0 or not connected</td>
</tr>
<tr>
<td></td>
<td>CCW at Vi = Log 1</td>
</tr>
</tbody>
</table>
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Order number

<table>
<thead>
<tr>
<th>HBE</th>
<th>58 -</th>
<th>K</th>
<th>A</th>
<th>65,536</th>
<th>R</th>
<th>S</th>
<th>E</th>
<th>01</th>
</tr>
</thead>
</table>

- **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:**
    - 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.
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**Installation drawing**

**Standard design form:** clamped flange and shaft ø 10 mm with flattened area

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

**Dimensions in mm**
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Further possible design form: clamped flange, shaft 10 mm with woodruff key

Order number: HBE58 - KFA 65,536 R S E01

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

[Diagram showing dimensions and design features, including sensor connector M12, 8-pole pins, A-coded, aligned, blanking plug, coding pin, NILOS ring, groove for feather key, and detail A 2:1.]
High resolution absolute single-turn rotary encoder
Model HBE

Installation drawing

Further possible design form: clamped flange, shaft for play compensating toothed gear ZRS
(toothed gear, see accessories)

Order number: HBE58 - KZA 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

Clamping shaft
Di = 12 H7
Insertion depth: 16 mm

Sensor connector M12
8-pole pins, A-coded aligned

Blanking plug
Coding pin

Clamping ring (Aluminium)
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

![Diagram of the encoder with dimensions and annotations](image-url)
High resolution
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Installation drawing

Further possible design form: synchro flange, shaft 12 mm
Order number: HBE65 - SA 65,536 R S E01

Dimensions in mm

Sensor connector M12
8pole pin, A-coded, aligned

Blind plug

Coding pin