Product Information

**KCI 1319  
KBI 1335**

Absolute Inductive Rotary Encoders without Integral Bearing
KCI 1319, KBI 1335

Rotary encoders for absolute position values
- Robust inductive scanning principle
- Consisting of an AE scanning unit and a rotor unit

Required mating dimensions for AE KAt 13xx

<table>
<thead>
<tr>
<th>Diagram</th>
<th>Description</th>
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<tbody>
<tr>
<td><img src="image1.png" alt="Diagram" /></td>
<td>Rotor fastening via three axial countersunk head screws</td>
</tr>
<tr>
<td><img src="image2.png" alt="Diagram" /></td>
<td>Rotor fastening via press-fitted hub</td>
</tr>
</tbody>
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All drawings with brakes released

<table>
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<td><img src="image3.png" alt="Diagram" /></td>
<td>Rotary encoders for absolute position values</td>
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<td><img src="image4.png" alt="Diagram" /></td>
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<td><img src="image5.png" alt="Diagram" /></td>
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Product Information KCI 1319, KBI 1335 | 11/2021
### Specifications | KCI 1319 singletum | KBI 1335 multiturn
--- | --- | ---
**Interface** | EnDat 2.2 | EnDat22
**Ordering designation** | EnDat22 | EnDat22
**Position values per revolution** | 524,288 (19 bits) | 524,288 (19 bits)
**Revolutions** | Description | 65536 (18 bits)
**Calculation time t_cal** | ≤ 5 µs | ≤ 16 MHz
**Clock frequency** | ≤ 10 MHz | ≤ 10 MHz
**System accuracy** | ±90° | ±90°
**Electrical connection** | 15-pin PCB connector (with connection for external temperature sensor) | 15-pin PCB connector (with connection for external temperature sensor)
**Cable length** | ≤ 100 m (see the EnDat description in the Interfaces of HEIDENHAIN Encoders brochure) | ≤ 100 m (see the EnDat description in the Interfaces of HEIDENHAIN Encoders brochure)
**Supply voltage** | DC 3.6 V to 14 V | DC 3.6 V to 14 V
**Rotary encoder U_r**: DC 3.6 V to 14 V | Backup battery U_{Bat}: DC 3.6 V to 5.25 V | Backup battery U_{Bat}: DC 3.6 V to 5.25 V
**Power consumption** | At 2.6 V: ≤ 650 mW | At 2.6 V: ≤ 650 mW
**At 14 V**: ≤ 700 mW | **At 14 V**: ≤ 700 mW
**Current consumption (typical)** | At 5 V: 95 mA (without load) | Normal operation at 5 V: 95 mA (without load)
**Backup battery**: 200 µA (rotating shaft) | **Backup battery**: 200 µA (rotating shaft)
**Part number** | AE KCI 1319 scanning head 1314403-01 | AE KBI 1335 scanning head 1314404-01
**Circular scale (screw-fastened version)** | 1314410-01 | Circular scale (screw-fastened version)
**Disk/hub assembly (press-fitted version)** | 1314409-01 | Disk/hub assembly (press-fitted version)

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### Specifications | KCI 1319 singletum | KBI 1335 multiturn
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**Rotor** | Circular scale with inside hub diameter of 25 mm (press-fitted version) | Circular scale with circular hole pattern diameter of 30.5 mm (screw-fastened version)
**Shaft speed** | ≤ 10,000 rpm | ≤ 10,000 rpm
**Moment of inertia** | Disk/hub assembly: 6.3 · 10^-6 kgm² | Circular scale: 1.16 · 10^-6 kgm²
**Angular acceleration of rotor** | ≤ 1 · 10^5 rad/s² | ≤ 1 · 10^5 rad/s²
**Axial motion of measured shaft** | ≤ 0.5 mm | ≤ 0.5 mm
**Vibration** | 55 Hz to 2000 Hz | 55 Hz to 2000 Hz
**Shock** | 6 ms | 6 ms
**Stator**: ≤ 400 m/s² | **Rotor**: ≤ 600 m/s² (EN 60068-2-6) | ≤ 2000 m/s² (EN 60068-2-27)
**Operating temperature** | -40 °C to 115 °C | -40 °C to 115 °C
**Trigger threshold of temperature exceedance** | 130 °C (measuring accuracy of the internal temperature sensor: ±1 K) | 130 °C (measuring accuracy of the internal temperature sensor: ±1 K)
**Relative humidity** | ≤ 93 % (40 °C/21 d as per EN 60068-2-78), condensation excluded | ≤ 93 % (40 °C/21 d as per EN 60068-2-78), condensation excluded
**Protection rating** | EN 60529 | EN 60529
**Mass** | AE + TK = 0.03 kg | AE + TKN = 0.06 kg

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1) See General electrical information in the Interfaces of HEIDENHAIN Encoders brochure or at www.heidenhain.com
2) At T = 25 °C, U_{Bat} = 3.6 V

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*Please select when ordering

1) With multiturn functionality in normal operation; maximum permissible acceleration in backup battery mode upon request

2) At T = 25 °C; U_{Bat} = 3.6 V
Mounting

The KCI 1319/KBI 1335 is mounted either via screw-fastening of the circular scale or through press-fitting of the disk/hub assembly and mounting of the scanning unit. The disk/hub assembly is thereby either press-fitted onto the shaft, or the circular scale is screw-fastened to the given shaft with three screws. The scanning unit is aligned and mounted via four holes on the customer’s mounting surface.

The press-fitting process may be performed only once for each disk/hub assembly. For the press-fit, comply with the material properties and conditions for the mating surface stated for proper use in the relevant documents. These requirements must be followed, even when new disk/hub assemblies are press-fitted onto customer shafts that have already been used. Once the lower limit of the press-fit force has been exceeded, the press-fit force being applied must remain within the specified range for the rest of the procedure until the end position is reached.

The following material properties and conditions must be complied with for the customer-side mounting design:

<table>
<thead>
<tr>
<th>Material</th>
<th>Tensile strength $R_m$</th>
<th>Yield strength $R_{o,0.2}$ or yield point $R_y$</th>
<th>Shear strength $\tau_{m}$</th>
<th>Interface pressure $P_G$</th>
<th>Modulus of elasticity $E$ (at 20 °C)</th>
<th>Coefficient of thermal expansion $\alpha_{therm}$ (at 20 °C)</th>
<th>Surface roughness $R_z$</th>
<th>Friction values</th>
<th>Tightening procedure</th>
<th>Mounting temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mating stator</td>
<td>Aluminum</td>
<td>$\geq 220 , \text{N/mm}^2$</td>
<td>–</td>
<td>$\geq 250 , \text{N/mm}^2$</td>
<td>70 kN/mm² to 75 kN/mm²</td>
<td>$\leq 25 \cdot 10^{-6} , \text{K}^{-1}$</td>
<td>$\leq 16 , \mu\text{m}$</td>
<td>Mounting surfaces must be clean and free of grease. Use screws and washers from HEIDENHAIN in their condition as delivered.</td>
<td>Use a signal-emitting torque wrench as per DIN EN ISO 6789, with an accuracy of ±6 %</td>
<td>15 °C to 35 °C</td>
</tr>
<tr>
<td>Mating shaft</td>
<td>Steel</td>
<td>$\geq 600 , \text{N/mm}^2$</td>
<td>$\geq 400 , \text{N/mm}^2$</td>
<td>$\geq 660 , \text{N/mm}^2$</td>
<td>200 kN/mm² to 215 kN/mm²</td>
<td>Screw-fastened version: 10 · 10⁻⁶ K⁻¹ to 12 · 10⁻⁶ K⁻¹</td>
<td>Press-fitted version: 10 · 10⁻⁶ K⁻¹ to 12 · 10⁻⁶ K⁻¹</td>
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Mounting accessories

Screws
Screws (fastening screws) are not included in delivery; the M3x10 screw with material bonding anti-rotation lock can be ordered separately.

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<tr>
<th>KCI 1319</th>
<th>Screws</th>
<th>Quantity</th>
</tr>
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<tr>
<td>Screw for fastening the scanning unit</td>
<td>ISO 4762-M3x10-8.8-MKL</td>
<td>10 or 100</td>
</tr>
<tr>
<td>Fastening screw for circular scale</td>
<td>ISO 14581-M2x6-A2-70</td>
<td>–</td>
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1) With coating for material bonding anti-rotation lock (for information on use, see the Encoders for Servo Drives brochure)
2) Without anti-rotation lock; use at least a medium-strength material bonding anti-rotation lock

Mounting aid
To avoid damage to the cable, use the mounting aid to connect and disconnect the cable assembly. Apply pulling force only to the connector of the cable assembly and not to the wires.

ID 1075573-01

For more mounting information and mounting aids, see the Mounting Instructions and the Encoders for Servo Drives brochure. The mounting quality can be inspected with the PWM 21 and the ATS software (see Document 1092415).
Electrical connection

Cables

**Output cables inside the motor housing** with TPE single wires (8 × 0.16 mm²) and net sleeve without shield

- **Output cable with 15-pin PCB connector and 8-pin M12 straight flange socket (male)** with TPE single wires for temperature sensor (2 × 0.16 mm²) and stripped cable end
  - ID 1119958-xx

**Output cable inside the motor housing** with TPE single wires (8 × 0.16 mm²) and heat shrink tubing without a shield

- **Output cable with 15-pin PCB connector and stripped cable end**
  - ID 640055-xx

**Output cable for HMC 6:** Ø 3.7 mm EPG 1 × (4 × 0.06 mm²) + 4 × 0.06 mm²

- **Output cable with 15-pin PCB connector and contact insert for 6-pin HMC 6 hybrid connecting element (male) with TPE single wires for temperature sensor (2 × 0.16 mm²), with cable clamp for shield connection**
  - ID 1072652-xx

Pin layout for KCI 1319

**8-pin M12 coupling or flange socket**

- **Power supply**
- **Serial data transmission**
- **Other signals**

<table>
<thead>
<tr>
<th>8</th>
<th>2</th>
<th>5</th>
<th>1</th>
<th>3</th>
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<th>7</th>
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- **U_p** = Power supply; **T** = Temperature
- **Sensor**: The sense line is connected in the encoder with the corresponding power line. Vacant pins or wires must not be used!

**15-pin PCB connector**

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<td>Violet</td>
<td>Yellow</td>
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**Cable shield** connected with housing; **U_p** = Power supply; **T** = Temperature

Vacant pins or wires must not be used!

Pin layout for KBI 1335

**8-pin M12 flange socket**

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- **U_p** = Power supply; **U_BAT** = External buffer battery (false polarity can result in damage to the encoder)
- Vacant pins or wires must not be used!

**1** Connected inside encoder

Further information:

- For connecting cables and adapter cables, see the Cables and Connectors brochure.
- Comply with the requirements described in the following documents to ensure correct and intended operation:
  - Brochure: Encoders for Servo Drives
  - Brochure: Cables and Connectors
  - Brochure: Interfaces of HEIDENHAIN Encoders
  - Mounting Instructions: AE KCI 1319, KBI 1335
  - Mounting Instructions: TK KxI 13xx, TN KxI 13xx

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Further information:

- Visit our website at www.heidenhain.de for more information.