Product Information

**ECN 1325**
**EQN 1337**

Absolute Rotary Encoders with Blind Hollow Shaft for Safety-Related Applications

1327452-02
1327453-04
ECN 1325, EQN 1337

Rotary encoders for absolute position feedback with safe singleturn information

- 65 mm installation diameter
- 07B expanding ring coupling
- 67M blind hollow shaft (Ø 12.7 mm) for axial clamping

Specifications

ECN 1325 singleturn

- **Functional safety**
  - As a single-encoder system for monitoring functions and closed-loop functions
  - SIL 2 as per EN 61508 (further basis for testing: IEC 61800-5-3)
  - Category 3, PL d, according to EN ISO 13849-1:2015
- **PFH1)** ≤ 10 · 10⁻⁹ (probability of dangerous failure per hour)
- **Safe position2)**
  - Encoder: ±1.76° (safety-related measuring step: SM = 0.7°)
  - Mechanical coupling: ±2° (exclusion for loosening of shaft and stator coupling; designed for accelerations of ≤ 300 m/s²)

- Interface/ordering designation: EnDat 2.2/EnDat22
- Position values per revolution: 33 554 432 (25 bits)
- Calculations time / clock frequency: ≤ 7 µs / 16 MHz
- **System accuracy**
  - at 20 °C ±2°
- **Supply voltage**
  - DC 3.6 V to 14 V
- **Power consumption (maximum)**
  - At 3.6 V: ≤ 600 mW; At 14 V: ≤ 700 mW
  - At 3.6 V: ≤ 700 mW; At 14 V: ≤ 800 mW
- **Current consumption (typical)**
  - At 5 V: 80 mA (without load)
  - At 5 V: 95 mA (without load)

- **Electrical connection**
  - PCB connector: 16-pin (12+4-pin), with connection for external temperature sensor3)
  - Cable length4): ≤ 100 m (at clock frequency ≤ 8 MHz)
  - At 14 V: ≤ 20 m (at clock frequency ≤ 16 MHz)

- **Shaft**
  - 67M blind hollow shaft for axial clamping (Ø 12.7 mm)
  - Permissible shaft speed: ≤ 12 000 rpm
  - Starting torque at 20 °C (typical): ≤ 0.01 Nm
  - Moment of inertia of rotor: 3.6 · 10⁻⁶ kgm²
  - Angular acceleration of rotor: ≤ 5 · 10⁴ rad/s²
  - Natural frequency f₂ (typical): ≥ 1850 Hz
  - Permiss. axial motion of measured shaft: ≤ ±0.5 mm
  - Vibration 55 Hz to 2000 Hz: ≤ 300 m/s² (EN 60068-2-6); 10 Hz to 55 Hz constant over 4.9 mm peak to peak ≤ 2000 m/s² (EN 60068-2-27)

- **Operating temperature**
  - −30 °C to 115 °C
- **Trigger threshold of error message due to excessive temperature6)**
  - 125 °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
- **Protection**
  - EN 60529: IP40 (read about insulation under Electrical safety in the Interfaces of HEIDENHAIN Encoders brochure; contamination through the ingress of liquids must be avoided)

- **Mass**
  - ≈ 0.3 kg

- ID number
  - ECN 1325: 132J452-02
  - EQN 1337: 132J453-04

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5) Valid at room temperature in accordance with the standards; at operating temperatures of up to 100 °C: ≤ 300 m/s²; up to 115 °C: ≤ 150 m/s²; (≥ 100 °C: 10 Hz to 55 Hz constant over 2.45 mm peak to peak)

6) The internal temperature evaluation is not designed with functional safety

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1) For use at ≤ 2000 m above sea level
2) Further tolerances may arise in the downstream electronics after position value comparison (contact the manufacturer)
3) Connectable temperature sensor for rotary encoders: KTY 84-130 or PT 1000 (see Temperature measurement in motors in the Encoders for Servo Drives brochure)
4) See the EnDat description in the Interfaces of HEIDENHAIN Encoders brochure
5) For use at ≤ 2000 m above sea level (≤ 6000 m above seal level upon request)

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**Required mating dimensions**

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø 12.7 mm</td>
<td>Bearing of mating shaft1)</td>
</tr>
<tr>
<td>Ø 21 ± 0.3 mm</td>
<td>Measuring point for operating temperature2)</td>
</tr>
<tr>
<td>21 ± 0.3 mm</td>
<td>Measuring point for vibration (see D8/171/4)3)</td>
</tr>
<tr>
<td>14.1 mm</td>
<td>Clamping screw for coupling ring: width A/F 2; tightening torque: 1.25 Nm - 0.2 Nm</td>
</tr>
<tr>
<td>21 ± 0.3 mm</td>
<td>Die-cast cover4)</td>
</tr>
<tr>
<td>24 mm</td>
<td>Screw plug: widths A/F 3 and 4; tightening torque: 5 Nm + 0.5 Nm</td>
</tr>
<tr>
<td>16-pin (12+4-pin) PCB connector</td>
<td>5)</td>
</tr>
<tr>
<td>M6x30 - M5x25 – 08.8 – MKL</td>
<td>Screw: DIN 6912 – M5x25 – 08.8 – MKL; width A/F 4; tightening torque: 5 Nm + 0.5 Nm</td>
</tr>
<tr>
<td>≤ 3.6 · 10⁻⁶ kgm²</td>
<td>Compensated mounting tolerances and thermal expansion; no dynamic movement permitted</td>
</tr>
<tr>
<td>3.6 · 10⁻⁶ kgm²</td>
<td>Chamfer at start of thread is obligatory for material bonding anti-rotation lock</td>
</tr>
<tr>
<td>≤ ±2°</td>
<td>Direction of shaft rotation for ascending position values</td>
</tr>
</tbody>
</table>
Mounting

The shaft of the rotary encoder is pressed onto the motor’s drive shaft and fastened with a central screw. It is particularly important to ensure that the positive-locking element of the stator coupling securely engages the corresponding slot in the measured shaft. Use a central screw with material-bonding anti-rotation lock (see Mounting accessories). The stator coupling is clamped by means of an axially tightenable screw in a locating hole.

Mounting accessories

Screws
Screws (central screw, mounting screws) are not included in delivery and can be ordered separately.

<table>
<thead>
<tr>
<th>ECN 1325, EQN 1337</th>
<th>Screws</th>
<th>Lot size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DIN 6912 – M5x25 – 08.8 – MKL</td>
<td>ID 202284-65</td>
</tr>
</tbody>
</table>

1) With coating for material bonding anti-rotation lock

More information:
For the customer-side mounting design, the material specifications for steel apply to the customer-side shaft. For the customer-side stator, the material specifications for aluminum apply.

Also comply with the other material properties in the Encoders for Servo Drives brochure (ID 208922-xx).

Mounting aid
To avoid damage to the cable, use the mounting aid to connect and disconnect the cable assembly. The pulling force must be applied solely to the connector and not to the wires.

ID 1076573-01

For more mounting information and mounting aids, see the Mounting Instructions and the Encoders for Servo Drives brochure.

Electrical connection

Pin layout

16-pin (12+4-pin) PCB connector

<table>
<thead>
<tr>
<th>Power supply</th>
<th>Serial data transmission</th>
<th>Other signals 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1b</td>
<td>6a</td>
<td>4b</td>
</tr>
<tr>
<td>Up</td>
<td>Sensor</td>
<td>0 V</td>
</tr>
</tbody>
</table>

1) Only for adapter cables inside the motor housing
2) Connections for an external temperature sensor (see Temperature measurement in motors in the Encoders for Servo Drives brochure)

Cable shield: connected to housing; Up = Power supply voltage; T = Temperature

Sensor: The sense line is connected in the encoder with the corresponding power line.

Vacant pins or wires must not be used!

Note for safety-related applications: Only completely assembled HEIDENHAIN cables are qualified.
Do not modify cables or exchange their connectors without first consulting with HEIDENHAIN Traunreut!

More information:
Comply with the information in the following document to ensure correct and intended operation:
- Mounting Instructions: ECN 1325, EQN 1337

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