Product Information

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

Absolute Rotary Encoders with Tapered Shaft for Safety-Related Applications

ID 1178026-03
ID 1178026-53
ID 1178027-01
ID 1178027-53
ECN 1325, EQN 1337

 Rotary encoders for absolute position values with safe singleturn information

- 65 mm installation diameter
- 07B expanding ring coupling
- 65B tapered shaft

Specifications ECN 1325 singleturn EQN 1337 multiturn

**Functional safety**

- As a single-encoder system for monitoring functions and closed-loop functions
- SIL 2 as per EN 61508 (further basis for testing: EN 61800-5-2)
- Category 3, PL d, as per EN ISO 13849-1:2015

**Safe position**

1. Encoder: ±1.76° (safety-related measuring step: SM = 0.7°)
2. Mechanical coupling: ±2° (fault exclusion for loosening of shaft and stator coupling, designed for accelerations of ≤ 300 m/s²)

**PFH (probability of dangerous failure per hour)**

- 10 · 10⁻⁹

**Safe position**

- Encoder: ±1.76°
- Mechanical coupling: ±2°

**Electrical connection**

- Encoder PCB connector: 16-pin, with connection for temperature sensor

**Cable length**

- ≤ 100 m (at clock frequency ≤ 8 MHz)
- ≤ 20 m (at clock frequency ≤ 16 MHz)

**Shaft**

- 65B tapered shaft Ø 9.25 mm; taper 1:10

**Permissible shaft speed**

- 15 000 rpm
- 12 000 rpm

**Starting torque at 20 °C**

- ≤ 0.01 Nm

**Moment of inertia of rotor**

- 2.6 · 10⁻⁶ kgm²

**Angular acceleration of rotor**

- ≤ 1 · 10⁶ rad/s²

**Natural frequency of stator coupling**

- ≥ 1850 Hz

**Permissible axial motion of measured shaft**

- ±0.5 mm

**Vibration**

- 55 Hz to 2000 Hz

**Shock**

- 6 ms

**Operating temperature**

- –40 °C to 115 °C

**Trigger threshold of error message due to excessive temperature**

- 125 °C (measuring accuracy of the internal temperature sensor: ± 1 K)

**Relative humidity**

- ≤ 93 % (40 °C/21 d as per EN 60068-2-78), without condensation

**Protection**

- EN 60529

**Mass**

- 0.25 kg

**ID number**

- 1178026-03
- 1178026-537
- 1178027-01
- 1178027-537

**Bold:** This preferred version is available on short notice

1. For use at ≤ 2000 m above sea level (≤ 6000 m above sea level upon request)
2. Further tolerances may arise in the subsequent electronics after position value comparison (contact mfr. of subsequent electronics)
3. See: Temperature measurement in motors in the Encoders for Servo Drives brochure
4. See EnDat description in the Interfaces of HEIDENHAIN Encoders brochure; contamination through the ingress of fluids must be prevented
5. Valid at room temperature in accordance with standard; at operating temperatures of up to 100 °C: ≤ 300 m/s²; up to 155 °C: ≤ 150 m/s²
6. The internal temperature evaluation is not designed with functional safety
Mounting

The tapered shaft of the rotary encoder is slid onto the measured 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. A screw with material bonding anti-rotation lock must be used (see Mounting accessories). The stator coupling is clamped by means of an axially tightenable screw in a location hole.

Requirements on the motor side for a safe mechanical coupling:

<table>
<thead>
<tr>
<th>Mating shaft</th>
<th>Mating stator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel</td>
<td>Aluminum</td>
</tr>
</tbody>
</table>

Rotary encoders may exert a torque of up to 1 Nm on the mating shaft. The customer-side mechanical design must be made for this load.

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>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central screw for shaft fastening</td>
<td>DIN 6912 – M5x50 – 08.8 – MKL</td>
<td>ID 202264-54</td>
</tr>
</tbody>
</table>

Further information:

In addition, comply with the material specifications and other material characteristics in the Encoders for Servo Drives brochure (ID 208922-xx).

Electrical connection: cables

EPG output cable inside the motor housing Ø 3.7 mm (with shield Ø 6.1 mm); [1 × 4 × 0.06 mm²] + [4 × 0.06 mm²] and TPE wires 2 × 0.16 mm² for temperature sensor

With 16-pin PCB connector and 9-pin M23 SpeedTEC angle flange socket (male)

<table>
<thead>
<tr>
<th>PUR adapter cables and connecting cables</th>
<th>8-pin M12 connector</th>
<th>9-pin M23 connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø 6 mm; [2 × 0.08 mm²] + [2 × 0.16 mm²]; Aº = 2 × 0.16 mm²</td>
<td>ID 1036372-xx</td>
<td>ID 1136883-xx</td>
</tr>
<tr>
<td>With 8-pin M12 connector (female) and 8-pin M12 coupling (male)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>With 8-pin M12 connector (female) and 15-pin D-sub connector (female)</td>
<td>ID 1038521-xx</td>
<td></td>
</tr>
<tr>
<td>With 8-pin M12 connector (female) and 15-pin D-sub connector (male)</td>
<td>ID 1038526-xx</td>
<td></td>
</tr>
<tr>
<td>With 8-pin M12 connector (female) and unstripped cable end</td>
<td>ID 1129581-xx^-1</td>
<td></td>
</tr>
</tbody>
</table>

Aº = Cross section of the supply wires

^-1 Comply with the EMC requirements in the General electrical information in the Interfaces of HEIDENHAIN Encoders brochure

Note for safety-related applications:

• Bit error as per Specification 533095 must be documented!

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Further information:

In addition, comply with the material specifications and other material characteristics in the Encoders for Servo Drives brochure (ID 208922-xx).

Please note the information on screws from HEIDENHAIN in the Encoders for Servo Drives brochure, under Screws with material bonding anti-rotation lock in the chapter General mechanical information.

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. The mounting quality can be inspected with the PWM 21 and ATS software.
Electrical connection

Pin layout

8-pin M12 coupling or flange socket

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<tr>
<th>Power supply</th>
<th>Serial data transmission</th>
<th>Other signals</th>
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<tbody>
<tr>
<td>M12</td>
<td>8 2 5 1 3 4 7 6</td>
<td>/ /</td>
</tr>
<tr>
<td>M23</td>
<td>3 7 4 8 5 6 1 2</td>
<td>/ /</td>
</tr>
<tr>
<td>16-pin PCB connector</td>
<td>1b 6a 4b 3a 6b 1a 2b 5a 8a 8b</td>
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<td>16</td>
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9-pin M23 SpeedTEC angle flange socket

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Power supply Serial data transmission Other signals

1) Only for adapter cables inside the motor housing
2) Connections for external temperature sensor; evaluation optimized for KTY 84-130 (see Temperature measurement in motors in the Encoders for Servo Drives brochure)

Cable shield connected with housing; Up = 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!

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!

SpeedTEC is a registered trademark of TE Connectivity Industrial GmbH.

Further information:
To ensure proper and intended use, comply with the specifications in the following documents:
- Brochure: Encoders for Servo Drives
- Brochure: Cables and Connectors
- Mounting Instructions: ECN 1325, EON 1337
- Technical Information: Safety-Related Position Measuring Systems
- For implementation in a safe control or inverter: Specification
- Brochure: Interfaces of HEIDENHAIN Encoders

This Product Information document supersedes all previous editions, which thereby become invalid. The basis for ordering from HEIDENHAIN is always the Product Information document edition valid when the order is placed.

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