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 feedback with safe singletum information

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

Specifications ECN 1325 singleturn EQN 1337 multiturn

Functional safety

for applications with up to 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)

Revolutions

- 4096 (12 bits)

Calculation time tcalc/clock frequency

≤ 7 µs/16 MHz

System accuracy

at 20 °C ±20

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 3.6 V: 800 mW;
- At 14 V: 800 mW

Electrical connection

PCB connector: 16-pin (12+4-pin), with connection for external temperature sensor3)

Cable length4)

- ≤ 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

Starting torque at 20 °C (typical)

≤ 0.01 Nm

Moment of inertia of rotor

2.6 · 10⁻⁶ kgm²

Angular acceleration of rotor

≤ 1 · 10⁵ rad/s²

Natural frequency fn (typical)

≥ 1800 Hz

Permissible 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

-40 °C to 115 °C

Trigger threshold for exceeded temperature error message6)

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
IF40 (tread about insulation under Electrical safety in the Interfaces of HEIDENHAIN Encoders brochure; contamination through the ingress of liquids must be avoided)

Mass

= 0.25 kg

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1) For use at ≤ 2000 m above sea level (≤ 6000 m above sea level upon request)
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) Valid at room temperature in accordance with the standard; at operating temperatures of up to 100 °C: ≤ 300 m/s²; up to 115 °C: ≤ 150 m/s²
6) The internal temperature evaluation is not designed with functional safety
7) In collective package upon request

Required mating dimensions

A = Bearing of mating shaft
M1 = Measuring point for operating temperature
M2 = Measuring point for vibration (see DXA11714)
1 = Clamping screw for coupling ring; width A/F 2; tightening torque: 1.25 Nm – 0.2 Nm
2 = Die-cast cover
3 = Screw plug; widths A/F 3 and 4; tightening torque: 5 Nm + 0.5 Nm
4 = Slip-in (12+4-pin) header
5 = Screw; DIN 6912 – M5x50 – 08.8 – MKL; width A/F 4; tightening torque: 5 Nm + 0.5 Nm
6 = M50 back-off thread
7 = Compensation of mounting tolerances and thermal expansion; no dynamic movement permitted
8 = Chamfer at start of thread is mandatory for material bonding anti-rotation lock
9 = Direction of shaft rotation for ascending position values

10 = Inserting ISO 8018
ISO 2768: H9 – H11
≤ 6 mm: ±0.2 mm

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Mounting

The tapered shaft of the rotary encoder is pressed 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. 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>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central screw for shaft fastening</td>
<td>DIN 6912 – M5x50 – 08.8 – MKL</td>
<td>10 or 100</td>
</tr>
</tbody>
</table>

† With coating for material bonding anti-rotation lock

Please note the information on screws from HEIDENHAIN in the Encoders for Servo Drives brochure, under the heading 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

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

<table>
<thead>
<tr>
<th>Power supply</th>
<th>Serial data transmission</th>
<th>Other signals†</th>
</tr>
</thead>
<tbody>
<tr>
<td>1b</td>
<td>6a</td>
<td>4b</td>
</tr>
<tr>
<td>3a</td>
<td>6b</td>
<td>1a</td>
</tr>
<tr>
<td>2b</td>
<td>5a</td>
<td>1a/1b</td>
</tr>
<tr>
<td>DATA</td>
<td>DATA</td>
<td>CLOCK</td>
</tr>
<tr>
<td>CLOCK</td>
<td>T+</td>
<td>T–</td>
</tr>
</tbody>
</table>

† Only for adapter cables inside the motor housing

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:

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.

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.