Product Information

**ECN 1123**
**EQN 1135**

Absolute Rotary Encoders with 1KA Positive-Locking Hollow Shaft for Safety-Related Applications
Rotary encoders for absolute position values with safe singleturn information

- 75A mounted stator coupling
- 1KA blind hollow shaft (Ø 6 mm) for axial clamping

**Specifications**

### ECN 1123 singleturn

**Functional safety**

For applications up to

- SIL 1, as per EN 61508 (further basis for testing: IEC 61800-6-3)
- Category 2, PL c, as per EN ISO 13849-1:2015

**As a single-encoder system for closed-loop functions**

- SIL 2, as per EN 61508 (further basis for testing: IEC 61800-6-3)
- Category 3, PL d, in accordance with EN ISO 13849-1:2015

Safe in singleturn operation

**Safety position**

Encoder: ±1.7° (safety-related measuring step: SM = 0.7°)

Mechanical coupling: ±2° (inclination for loosening of shaft and stator coupling; designed for accelerations of ≤ 300 m/s²)

**Interface/ordering designation**

- EnDat 2.2

**Position values per revolution**

- At 3.6 V: ≤ 600 mV; at 14 V: ≤ 700 mV

**Revolutions**

- At 3.6 V: ≤ 700 mV; at 14 V: ≤ 800 mV

**Current consumption (typical)**

- At 5 V: ≤ 85 mA (without load)

**At 5 V: 105 mA (without load)**

**Electrical connection**

- 15-pin PCB connector (with connection for external temperature sensor)

**Cable length**

- ≤ 100 m (see EnDat description in the Interfaces of HEIDENHAIN Encoders brochure)

**Shaft**

- 1KA blind hollow shaft (Ø 6 mm) with positive-locking element

**Shaft speed**

- ≤ 12,000 rpm

**Starting torque (typical)**

- ≤ 0.001 Nm at 20 °C

**Moment of inertia of rotor**

- 0.4 · 10⁻⁶ kgm²

**Angular acceleration of rotor**

- ≤ 0.8 · 10⁻⁶ rad/s²

**Natural frequency fₙ (typical)**

- ≤ 1000 Hz

**Axial motion of measured shaft**

- ≤ ±0.5 mm

**Vibration**

- 55 Hz to 2000 Hz

**Shock**

- 6 ms

**Operating temperature**

- -40 °C to 110 °C

**Trigger threshold for temperature exceedance**

- 125 °C (measuring accuracy of the internal temperature sensor: ±5 K)

**Relative humidity**

- ≤ 93 % (40 °C) as per EN 60608-2-78; without condensation

**Protection**

- IP 40 (read about insulation under Electrical safety in the Interfaces of HEIDENHAIN Encoders brochure; contamination from the ingress of fluids must be avoided)

**Mass**

- ≤ 0.1 kg

**ID number**

- 743586-01
- 743586-51 (collective packaging)

**Power consumption**

- At 5 V:
  - 85 mA (without load)
  - 105 mA (without load)

**At 3.6 V:**

- 85 mA (without load)

**At 14 V:**

- 105 mA (without load)

**Current consumption (typical)**

- At 5 V: 105 mA

**System accuracy**

- At 20 °C ±60'

**Supply voltage**

- DC 3.6 V to 14 V

**Current consumption (typical)**

- At 5 V: 85 mA (without load)

- At 5 V: 105 mA (without load)

**Electrical connection**

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**Further tolerances may arise in the downstream electronics after position value comparison (contact mfr.)**

**Note:**

- For applications with up to

1) The internal temperature evaluation is not designed for functional safety

2) Further tolerances may arise in the downstream electronics after position value comparison (contact mfr.)

3) See General electrical information in the Interfaces of HEIDENHAIN Encoders brochure

4) Evaluation optimized for KTY 84-130 (see Temperature measurement in motors in the Encoder for Servo Drives brochure)

5) The internal temperature evaluation is not designed for functional safety
Mounting

The blind hollow shaft of the rotary encoder is seated onto the measured shaft and fastened with a central screw. It is particularly important to ensure that the positive-locking element of the rotary encoder shaft securely engages the corresponding slot in the measured shaft. Mounting on the stator side is performed without a centering collar on a flat surface with two clamping screws. Use screws with material bonding anti-rotation lock (see Mounting accessories).

Mounting accessories

<table>
<thead>
<tr>
<th>Screws</th>
<th>Central screw for ECN 1123</th>
<th>ISO 4762-M3x22-8.8-MKL</th>
<th>ID 202264-66</th>
<th>Lot size</th>
<th>10 or 100</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Central screw for EQN 1135</td>
<td>ISO 4762-M3x35-8.8-MKL</td>
<td>ID 202264-66</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fastening screw for flange</td>
<td>ISO 4762-M3x10-8.8-MKL</td>
<td>ID 202264-87</td>
<td></td>
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</tr>
</tbody>
</table>

1) 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

Mounting aid

The mounting aid allows the shaft of the rotary encoder to be turned from the rear of the device, making it easy to find the positive-locking connection between the encoder shaft and the measured shaft.

ID 821017-03

Electrical connection

Cables

Output cables inside the motor housing

<table>
<thead>
<tr>
<th>With 15-pin PCB connector and 8-pin M12 flange socket (male); TPE wires in braided sleeve and wires for a temperature sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>TPE 10 × 0.16 mm²</td>
</tr>
<tr>
<td>ID 1117412-xx</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>With 15-pin PCB connector; Ø 3.7 mm EPG (with shield crimping Ø 4.5 mm) and wires for temperature sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPG 1 × (4 × 0.06 mm²) + 4 × 0.06 mm²</td>
</tr>
<tr>
<td>TPE 2 × 0.16 mm²</td>
</tr>
<tr>
<td>ID 1108578-xx</td>
</tr>
</tbody>
</table>

1) Wires with braided sleeve

More information: The shield connection must be implemented on the motor

Information for safety-related applications: Document the bit error rate in accordance with Specification 533095!

Pin layout

15-pin PCB connector

<table>
<thead>
<tr>
<th>Power supply</th>
<th>Serial data transmission</th>
<th>Other signals 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td>12</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>9</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>T4 2)</td>
<td>T5 2)</td>
</tr>
<tr>
<td>U_p Sensor</td>
<td>0 V</td>
<td>DATA</td>
</tr>
<tr>
<td>Sensor 0 V</td>
<td>DATA</td>
<td>CLOCK</td>
</tr>
<tr>
<td>Sensor 4 V</td>
<td>DATA</td>
<td>T4 2)</td>
</tr>
<tr>
<td>White/Green</td>
<td>Blue</td>
<td>White/Green</td>
</tr>
<tr>
<td>Brown/Green</td>
<td>Pink</td>
<td>Violet</td>
</tr>
<tr>
<td>Yellow</td>
<td>T5 2)</td>
<td>Brown/Green</td>
</tr>
<tr>
<td>1) Only with output cables inside the motor housing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2) Connections for external temperature sensor; evaluation optimized for KTY 84-130 (see Temperature measurement in motors in the Encoders for Servo Drives brochure)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Cable shield: connected to housing; U_p = Power supply voltage

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!

Output cables with a cable length > 0.5 m require strain relief for the cable.

More information:

For the customerside mounting design, the material properties and conditions in accordance with the General mechanical information in the Encoders for Servo Drives brochure (ID 208922-xx) must be complied with.

The material specifications for aluminum and steel apply both to the customerside shaft and stator.

Information for safety-related applications:

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.

More information:

Comply with the requirements described in the following documents to ensure correct and intended operation:

• Operating Instructions