Product Information

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

Absolute Rotary Encoders with DRIVE-CLiQ Interface for Safety-Related Applications

Firmware 53

01/2023
ECN 1123S, EQN 1135 S

Rotary encoders for absolute position values with safe singleturn information

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

### Required mating dimensions

<table>
<thead>
<tr>
<th>2</th>
<th>Bearing of mating shaft</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Measuring point for operating temperature</td>
</tr>
<tr>
<td>4</td>
<td>Measuring point for vibration</td>
</tr>
<tr>
<td>5</td>
<td>Contact surface of set</td>
</tr>
<tr>
<td>6</td>
<td>Charnel at start of thread is mandatory for material bonding and anti-rotation lock</td>
</tr>
<tr>
<td>7</td>
<td>Shaft surface; ensure full-surface contact!</td>
</tr>
<tr>
<td>9</td>
<td>Slot required only for ECN/EQN and ECI/EQI with WELLAT = 1KA</td>
</tr>
<tr>
<td>10</td>
<td>Bore flange surface; ensure full-surface contact!</td>
</tr>
<tr>
<td>11</td>
<td>Coupling surface of ECN/EQN</td>
</tr>
<tr>
<td>12</td>
<td>Maximum permissible deviation between the shaft surface and coupling surface</td>
</tr>
<tr>
<td>14</td>
<td>Maximum permissible deviation between shaft and flange surfaces; compensation of mounting tolerances and thermal expansion, of which ±0.15 mm of dynamic axial motion is permitted</td>
</tr>
</tbody>
</table>

### Specifications

#### ECN 1123S singleturn

- **Functional safety** for applications with up to 4096 revolutions per revolution
- **Bearing** of the mating shaft
- **Shaft coating** not permitted
- **Direction of shaft rotation** for ascending position values
- **Cable fastener** with crimp sleeve; diameter: 4.3 mm ±0.1 mm; length: 7 mm
- **Contact surface** of the encoder shaft
- **Slot** required only for ECN/EQN and ECI/EQI with WELLAT = 1KA
- **Bore flange surface** of the encoder shaft
- **Cable length** 1 ± 0.4 mm
- **Cable** length 2 ± 0.1 mm
- **Cable** fastener 3 ± 0.1 mm
- **Cable** length 2 ± 0.1 mm
- **Cable** length 3 ± 0.1 mm
- **Protection rating** IP65
- **Relative humidity** 93% (40 °C/21 d as per EN 60068-2-78)
- **Temperature** 300 m/s² (EN 60068-2-27)
- **Temperature** 2000 m/s² (EN 60068-2-27)
- **Temperature** 40 °C to 95 °C
- **Relative humidity** 93% (40 °C/21 d as per EN 60068-2-78)
- **Temperature** 125 °C (measurement accuracy of the internal temperature sensor: ±0.7 K at 125 °C)
- **Mass** < 0.07 kg
- **ID number** 1121015-02

#### EQN 1135 S multiturn

- **Position values** per revolution 8 388 608 (23 bits)
- **Revolutions** ≤ 4096 (12 bits)
- **Calc. time** TIME_MAX_ACTVAL ≤ 8 μs
- **Temperature** 60 °C
- **System accuracy** at 20 °C ±60°
- **Position values per revolution** 8 388 608 (23 bits)
- **Revolutions** ≤ 4096 (12 bits)
- **Calc. time** TIME_MAX_ACTVAL ≤ 8 μs
- **Temperature** 60 °C
- **System accuracy** ±60°
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

Screws

<table>
<thead>
<tr>
<th>Screws</th>
<th>Lot size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central screw for ECN 1123</td>
<td>ISO 4762-M3×22-8.8-MKL ID 202264-65 10 or 100</td>
</tr>
<tr>
<td>Central screw for EQN 1135</td>
<td>ISO 4762-M3×35-8.8-MKL ID 202264-66</td>
</tr>
<tr>
<td>Fastening screw for flange</td>
<td>ISO 4762-M3×10-8.8-MKL ID 202264-87 20 or 200</td>
</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 1075573-01

Integrated temperature evaluation

These rotary encoders feature a temperature sensor integrated into the encoder electronics and an evaluation circuit for an external temperature sensor. In both cases, the respective digitized temperature value is transmitted purely serially via the DRIVE-CLiQ interface. Please bear in mind that neither the temperature measurement nor the transmission of the temperature value is safe in terms of functional safety.

The temperature measured by the internal temperature sensor is higher by a device-specific and application-specific amount than the temperature at measuring point M1, as shown in the dimension drawing.

Upon reaching a trigger threshold for the internal temperature sensor, these rotary encoders issue an “Alarm 405” error message. This threshold may vary depending on the encoder model and is stated in the specifications. During operation, it is recommended that the temperature be kept adequately below this threshold.

Fulfillment of the encoder’s intended use requires adherence to the operating temperature at measuring point M1.

The internal temperature sensor has an accuracy of ±0.7 K.

Temperature measurement in motors

To protect a motor from overloading, the motor manufacturer usually installs a temperature sensor in close proximity to the motor winding. A PT 1000 temperature sensor or a KTY 84-130 semiconductor sensor, for example, is to be used for this purpose. For a PT 1000, the following values apply with regard to the accuracy of the evaluation circuit:

- ±4 K at 80 °C to 160 °C
- ±6 K at –40 °C to 80 °C
- ±6 K at 160 °C to 200 °C

For a KTY 84-130 semiconductor sensor, the following values apply with regard to the accuracy of the evaluation circuit:

- ±2 K at 80 °C to 160 °C
- ±6 K at –40 °C to 80 °C
- ±6 K at 160 °C to 200 °C

The temperature values are transmitted via the DRIVE-CLiQ protocol.

The temperature sensor used is adjustable via Parameter 601 in the configuration software (e.g., Starter software) of the drive.

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 (ID 208922-xx) brochure must be complied with.

The material specifications for aluminum and steel apply both to the customer-side shaft and stator.
Online diagnostics and firmware version

Online diagnostics
For evaluation of the encoder’s functionality, valuation numbers can be cyclically read from the encoder. These valuation numbers reflect the current status of the encoder and can be used to determine its function reserves. The function reserves are also transmitted via the DRIVE-CLiQ interface and can be displayed in the higher-level control.

Further information is available from HEIDENHAIN upon request.

Firmware version
The firmware version can be read out via the DRIVE-CLiQ parameter “Act_FW_Version” (index 0). The final two digits of the displayed value are decisive.

Electrical connection

Cable
EPG encoder cable inside the motor (Ø 3.7 mm; 2 × (2 × 0.06 mm²) + 4 × 0.06 mm²; Ap = 0.06 mm²)
With shield crimping (Ø 4.3 mm) and wires for a temperature sensor 1) TPE 2 × 0.16 mm²
With 15-pin PCB connector and 8-pin LK28 M12 flange socket (male) 1)

ID 1217143-xx

1) Electromagnetic compatibility must be ensured in the complete system
2) The shield connection must be implemented on the motor side

Pin layout

8-pin M12 flange socket

Power supply
Serial data transmission
Other signals

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>M12</td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
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<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>U+</td>
</tr>
<tr>
<td>7</td>
<td>RXN</td>
</tr>
<tr>
<td>6</td>
<td>TXN</td>
</tr>
<tr>
<td>/</td>
<td>T+²</td>
</tr>
<tr>
<td>/</td>
<td>T-²</td>
</tr>
<tr>
<td>13</td>
<td>Brown/ Green</td>
</tr>
<tr>
<td>11</td>
<td>Blue</td>
</tr>
<tr>
<td>14</td>
<td>White/ Green</td>
</tr>
<tr>
<td>12</td>
<td>White</td>
</tr>
<tr>
<td>7</td>
<td>Gray</td>
</tr>
<tr>
<td>8</td>
<td>Pink</td>
</tr>
<tr>
<td>9</td>
<td>Violet</td>
</tr>
<tr>
<td>10</td>
<td>Yellow</td>
</tr>
<tr>
<td>5</td>
<td>Brown</td>
</tr>
<tr>
<td>6</td>
<td>Green</td>
</tr>
</tbody>
</table>

1) Only with output 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 to housing; U+ = Power supply voltage
Vacant pins or wires must not be used!
Output cables with a cable length > 0.5 m require strain relief for the cable.

DRIVE-CLiQ is a registered trademark of Siemens AG

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

• Operating Instructions