Product Information

ECI 1319 S
EQI 1331 S

Absolute Rotary Encoders without Integral Bearing

DRIVE-CLiQ (firmware 15)

0YA (44A/44C) flange
ECI 1319 S, EQI 1331 S

Rotary encoders for absolute position values with safe singleturn information

- Robust inductive scanning principle
- Mounting compatible with photoelectric rotary encoders with a 07B stator coupling
- Ø/ØA mounting range
- Blind hollow shaft for axial clamping Ø 12.7 mm (44C) or Ø 12 mm (44A)
- Cost-optimized mating dimensions upon request

Specifications

**Functional safety**

For applications with up to As a single-encoder system for monitoring functions and control-loop functions:

- SIL 2, as per EN 61508 (further basis for testing: IEC 61800-5-3)
- Category 3, PL d, in accordance with EN ISO 13849-1:2015

Safe in the singleturn range

**PFH:**

SIL 2: \( \leq 27 \cdot 10^{-9} \) (probability of dangerous failure per hour)

**Safe position:**

Encoder: ±0.88° (safety-related measuring step \( SM = 0.35° \))

Mechanical coupling: 0° (fault exclusion for the loosening of the shaft coupling and stator coupling; designed for accelerations at the stator of ≤ 400 m/s²; at the rotor: ≤ 600 m/s²)

**Interface**

Ordering designation: DQ01

Position values per revolution: 524,288 (19 bits)

Firmware: 01.32.27.15

Siemens software:

- SINAMICS, SIMOTION: ≥ 4.6 HF3
- SINUMERIK with safety: ≥ 4.7 SP1 HF1; SINUMERIK without safety: ≥ 4.5 SP2 HF4

Revolutions:

- ≤ 4096 (12 bits)

**TIME_MAX_ACTVAL:**

≤ 12 μs

**System accuracy:**

± 65°

**Electrical connection**

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

Cable length:

≤ 40 m (see description in the Interfaces of HEIDENHAIN Encoders brochure)

Supply voltage:

DC 24 V (10 V to 28.8 V; up to DC 36.0 V possible without impairing the functional safety)

Power consumption:

(maximum)

- At 10 V: ≤ 1100 mW
- At 28.8 V: ≤ 1250 mW
- At 10 V: ≤ 1200 mW
- At 28.8 V: ≤ 1350 mW

Current consumption (typical):

- At 24 V: ≤ 40 mA (without load)
- At 24 V: ≤ 45 mA (without load)

Shaft:

- Blind hollow shaft for axial clamping Ø 12.7 mm (44C) or Ø 12 mm (44A)
- Spindle speed:
  - ≤ 15,000 rpm
  - ≤ 12,000 rpm
- Moment of inertia of rotor:
  - 2.45 • 10⁻⁶ kgm²
  - 2.6 • 10⁻⁶ kgm²
- Angular acceleration of rotor:
  - ≤ 1 • 10³ rad/s²
- Axial motion of measured shaft:
  - ≤ 0.5 mm

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1) For use at ≤ 1000 m above sea level (≤ 6000 m above seal level upon request)
2) Further tolerances may arise in the downstream electronics after position value comparison (contact the manufacturer)
3) Information from Siemens as per the document "Certified encoders with DRIVE-CLiQ Dependencies on SIMOTION / SINUMERIK and SINAMICS Hardware and Software versions" (version: 04/2019)
4) The calculation time **TIME_MAX_ACTVAL** specifies the time after which a data transfer from the encoder to the control can start within the current-regulator clock time
5) See Temperature measurement in motors in the Encoders for Servo Drives brochure
6) See General electrical information in the Interfaces of HEIDENHAIN Encoders brochure or at www.heidenhain.com

DRIVE-CLiQ is a registered trademark of Siemens AG
The blind hollow shaft of the rotary encoder is pressed onto the measured shaft and fastened with a central screw. Mounting on the stator side is performed via a centering diameter with three mounting screws. Use screws with material bonding anti-rotation lock (see Mounting accessories).

The following conditions must be complied with for the customer-side mounting design:

<table>
<thead>
<tr>
<th>Specifications</th>
<th>ECI 1319 S singleturn</th>
<th>EQI 1331 S multiturn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vibration</td>
<td>55 Hz to 2000 Hz</td>
<td>55 Hz to 2000 Hz</td>
</tr>
<tr>
<td>Shock</td>
<td>6 ms</td>
<td>6 ms</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>–40 °C to 100 °C</td>
<td>–40 °C to 100 °C</td>
</tr>
<tr>
<td>Trigger threshold</td>
<td>120 °C (measuring accuracy of the internal temperature sensor: ±1 K)</td>
<td></td>
</tr>
<tr>
<td>Relative humidity</td>
<td>≤ 33% r.H. (as per EN 60068-2-78), condensation excluded</td>
<td></td>
</tr>
<tr>
<td>Protection rating</td>
<td>IP20 (read about insulation under General electrical information in the Encoders for Servo Drives brochure)</td>
<td></td>
</tr>
<tr>
<td>Material</td>
<td>Aluminum</td>
<td>Steel</td>
</tr>
<tr>
<td>Mass</td>
<td>≈ 0.13 kg</td>
<td></td>
</tr>
<tr>
<td>ID number*</td>
<td>ID 1222049-01 (shaft 44C)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ID 1222049-02 (shaft 44A)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ID 1222051-01 (shaft 44C)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ID 1222051-02 (shaft 44A)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ID 1222051-51 (shaft 44C)</td>
<td></td>
</tr>
</tbody>
</table>

* Please select when ordering; 44A shaft upon request

7) 10 Hz to 55 Hz, 4.9 mm constant peak to peak
8) In collective package

Further information:
Also pay attention to the other material properties in the Encoders for Servo Drives brochure (ID 208922-xx).

Mounting accessories

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

<table>
<thead>
<tr>
<th>ECI 1319 S</th>
<th>EQI 1331 S</th>
<th>Screws(^1)</th>
<th>Lot size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central screw for shaft fastening</td>
<td>ISO 6912-M5x30-08.8-MKL</td>
<td>ID 202264-76</td>
<td>10 or 100</td>
</tr>
<tr>
<td>Mounting screw for flange</td>
<td>ISO 4762-M4x10-8.8-MKL</td>
<td>ID 202264-85</td>
<td>30 or 300</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

For further mounting information and mounting aids, please refer to the relevant mounting instructions and the Encoders for Servo Drives brochure. The mounting quality can be checked with the PWM 21 and the ATS software.
Integrated temperature evaluation

This rotary encoder features an internal temperature sensor integrated into the encoder electronics, as well as an evaluation circuit for an external temperature sensor. The digitized temperature value of the external temperature sensor can be transferred purely serially over 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 in accordance with the dimension drawing. Upon reaching a trigger threshold for the internal temperature, the rotary encoder outputs an “Alarm 135” 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.

Compliance with the operating temperature at measuring point M1 is required for adherence to the encoder’s proper and intended use.

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.

For this purpose, a PT 1000 or, for example, a KTY 94-130 semiconductor sensor is to be used. For a PT1000, the following values apply with regard to the accuracy of the evaluation circuit:
- ±6 K at –40 °C to 80 °C
- ±4 K at 80.1 °C to 160 °C
- ±6 K at 160.1 °C to 200 °C

For a KTY 94-130 semiconductor sensor, the following values apply with regard to the accuracy of the evaluation circuit:
- ±6 K at –40 °C to 80 °C
- ±2 K at 80.1 °C to 160 °C
- ±6 K at 160.1 °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.

Electrical connection

Cables

- 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 6.1 mm and wires for temperature sensor
- 16-pin PCB connector and 9-pin M23 SpeedTEC angle flange socket (male) with wires for temperature sensor

- PUR adapter cable Ø 6.8 mm; 2 × (2 × 0.17 mm²) + 2 × 0.24 mm²; AP = 0.24 mm²

Pin layout

- 9-pin M23 SpeedTEC* connector (female) and 8+2-pin RJ45 connector (IP20)
- 9-pin M23 SpeedTEC connector (female) and 8-pin M12 coupling (male)

Ap: Cross section of power supply lines

* SpeedTEC is a registered trademark of TE Connectivity Industrial GmbH

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

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.