



# HEIDENHAIN



Product Information

## **ECI 1119** **EQI 1131**

Absolute Rotary Encoders  
Without Integral Bearing  
EnDat22

With additional measures:  
suitable for safety-related  
applications with up to SIL 3

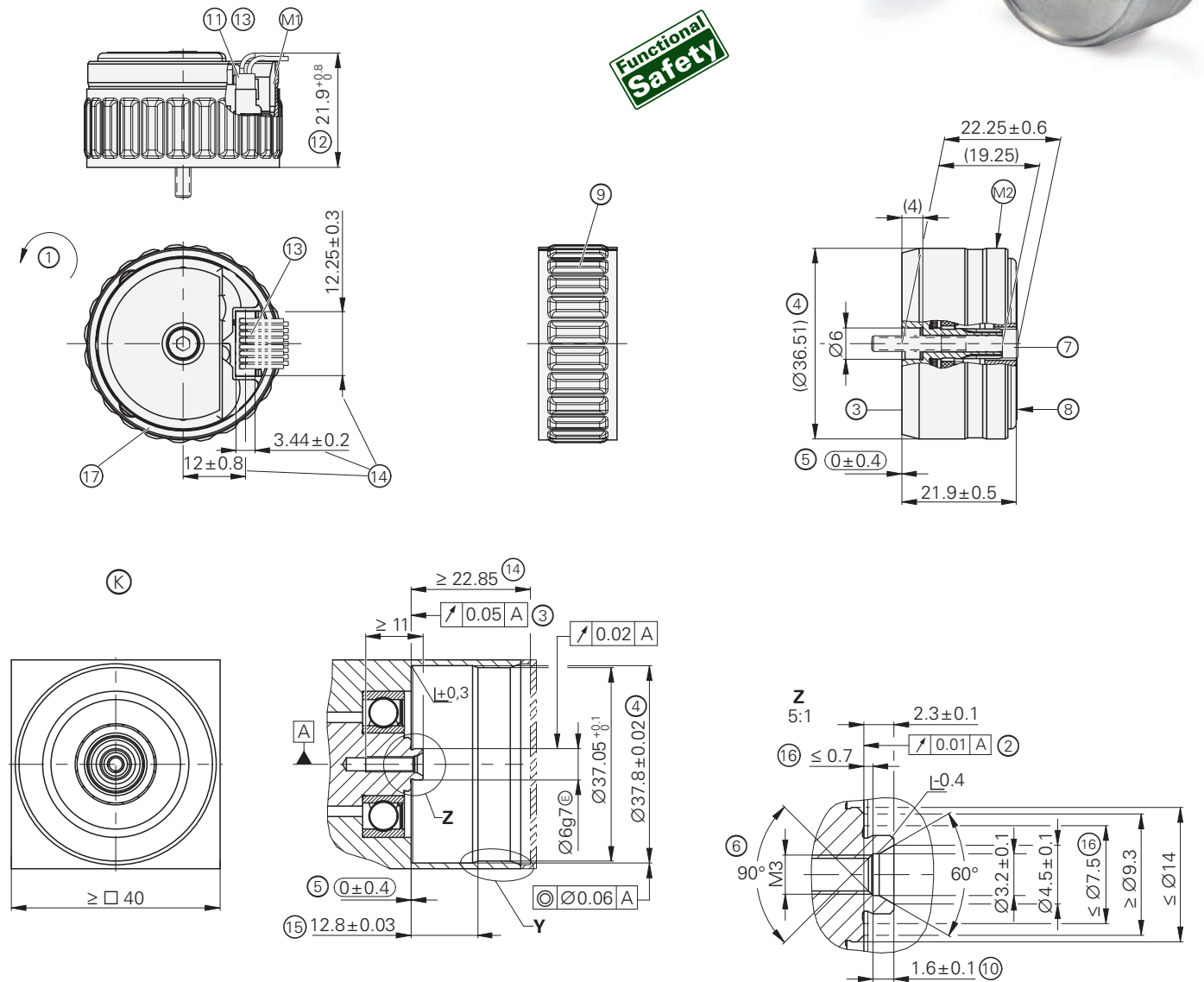
# ECI 1119, EQI 1131

Rotary encoders for absolute position values with safe singleturn information

- Robust inductive scanning principle
- 70G flange for press-fitting with a tolerance sleeve
- 82A blind hollow shaft (Ø 6 mm) for axial clamping without a positive-locking element
- Required mating dimensions with M3x25 central screw



Functional Safety



- ⊠ = Bearing of mating shaft
- ⊙ = Required mating dimensions
- M1 = Measuring point for operating temperature
- M2 = Measuring point for vibration
- 1 = Direction of shaft rotation for ascending position values
- 2 = Shaft surface; ensure full-surface contact!
- 3 = Flange surface; ensure full-surface contact!
- 4 = Centering diameter
- 5 = Mounting clearance:  
Maximum permissible deviation between shaft and flange surfaces; compensation of mounting tolerances and thermal expansion, dynamic motion permitted over entire range.
- 6 = Chamfer at start of thread is mandatory for material bonding anti-rotation lock
- 7 = Screw: DIN EN ISO 4762 – M3x25 – 8.8 with material bonding anti-rotation lock: ID 202264-86; tightening torque: 1.0 Nm ±0.1 Nm
- 8 = Warning! Surface not for clamping
- 9 = Flange fastening with tolerance sleeve (for press-fitting parameters, see the mounting instructions)
- 10 = Possible centering hole
- 11 = 15-pin PCB connector
- 12 = Dimension for JH standard cable
- 13 = Ensure space for cable
- 14 = Distance to cover; note the opening for PCB connector, header connector, and wires
- 15 = Min. wall thickness: 1.09 mm; no interruption permitted!
- 16 = Undercut
- 17 = Surface for application of force for press-fitting the encoder (ensure full-surface contact)

Workpiece edges as per ISO 13715 -0.3

mm  
Tolerancing ISO 8015  
ISO 2768:1989-mH  
≤ 6 mm: ±0.2 mm

Specifications	ECI 1119 singleturn	EQI 1131 – multiturn
Valid for	82A shaft: ID 1164809-05/-55 <sup>1)</sup>	82A shaft: ID 1164811-05/-55 <sup>1)</sup>
Functional safety for applications with up to	As a single-encoder system for monitoring functions and closed-loop functions <ul style="list-style-type: none"> <li>• SIL 2 as per EN 61508 (further basis for testing: IEC 61800-5-3)</li> <li>• Category 3, PL d as per EN ISO 13849-1:2015</li> </ul> With additional measures as per document 1000344 for safety-related applications with up to SIL 3 or category 4, PL e Safe in the singleturn range	
PFH <sup>6)</sup>	SIL 2: ≤ 15 · 10 <sup>-9</sup> (probability of dangerous failure per hour); SIL 3: ≤ 2 · 10 <sup>-9</sup>	
Safe position <sup>2)</sup>	Encoder: ±0.88° (safety-related measuring step: SM = 0.35°) Mechanical coupling of 82A shaft: ± 0° (fault exclusion for the loosening of the shaft coupling and stator coupling; designed for accelerations at the stator of ≤ 400 m/s <sup>2</sup> ; at the rotor: ≤ 600 m/s <sup>2</sup> )	
Interface	EnDat 2.2	
Ordering designation	EnDat22	
Position values per revolution	524288 (19 bits)	
Revolutions	–	4096 (12 bits)
Calculation time t <sub>cal</sub> /Clock frequency	≤ 5 µs / ≤ 16 MHz	
Analog delay time t <sub>AD</sub> (typical)	13.9 µs	
System accuracy	±120"	
Electrical connection	15-pin PCB connector (with connection for external temperature sensor <sup>3)</sup> )	
Cable length	≤ 100 m (see the EnDat description in the <i>Interfaces of HEIDENHAIN Encoders</i> brochure)	
Supply voltage	DC 3.6 V to 14 V	
Power consumption <sup>4)</sup> (max.)	At 3.6 V: ≤ 650 mW; at 14 V: ≤ 700 mW	At 3.6 V: ≤ 750 mW; at 14 V: ≤ 850 mW
Current consumption (typical)	At 5 V: 95 mA (without load)	At 5 V: 115 mA (without load)
Shaft	82A blind hollow shaft (Ø 6 mm) for axial clamping, without positive-locking element	
Speed	≤ 15000 rpm	≤ 12000 rpm
Moment of inertia of rotor	0.2 · 10 <sup>-6</sup> kgm <sup>2</sup>	
Angular acceleration of rotor	≤ 1 · 10 <sup>5</sup> rad/s <sup>2</sup>	
Axial motion of measured shaft	≤ ±0.4 mm	
Mounting clearance	2 mm (nominal value for checking the mounting quality in the ATS software, under "Mounting")	
Vibration 55 Hz to 2000 Hz <sup>5)</sup> Shock 6 ms	Stator: ≤ 400 m/s <sup>2</sup> ; rotor: ≤ 600 m/s <sup>2</sup> (EN 60068-2-6) ≤ 2000 m/s <sup>2</sup> (EN 60068-2-27)	
Operating temperature	–40 °C to 110 °C	
Trigger threshold for error message due to temperature exceedance	125 °C (measuring accuracy of internal temperature sensor: ±1 K)	
Relative humidity	≤ 93% (40 °C/21 d as per EN 60068-2-78), without condensation	
Protection rating EN 60529	IP00 (see <i>Electrical safety</i> under <i>General electrical information</i> in the <i>Interfaces of HEIDENHAIN Encoders</i> brochure)	
Mass	≈ 0.04 kg	

<sup>1)</sup> Rotary encoders in collective package

<sup>2)</sup> Further tolerances may arise in the downstream device after position value comparison (contact mfr. of the downstream device)

<sup>3)</sup> See *Temperature measurement in motors* in the *Encoders for Servo Drives* brochure

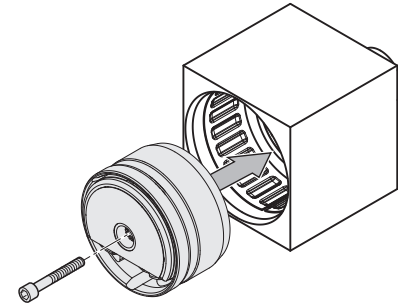
<sup>4)</sup> See *General electrical information* in the *Interfaces of HEIDENHAIN Encoders* brochure

<sup>5)</sup> At 10 Hz to 55 Hz, constant over 6.5 mm peak to peak (stator), 10 mm peak to peak (rotor)

<sup>6)</sup> For use at ≤ 2000 m above sea level (≤ 6000 m above sea level upon request)

# Mounting

After inserting the tolerance sleeve (see *Mounting accessories*) in the customer's machine, the encoder flange is press-fit until it comes to a stop in axial direction. Then the blind hollow shaft of the rotary encoder is fastened to the customer's drive shaft with a central screw (see the mounting instructions).



## Further information:

For the customer-side mounting design, aluminum and steel are permissible materials for the customer-side shaft and stator.

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

## Mounting accessories

### Fastening elements

The central screw and the tolerance sleeve are not included in delivery and can be ordered separately.

ECI 1119 EQI 1131	Fastening elements		Quantity
<b>Central screw</b> <sup>1)</sup> for shaft fastening	ISO 4762- <b>M3x25-8.8-MKL</b>	ID 202264-86	10 or 100
<b>Tolerance sleeve for clamping the flange</b>	D 37.8 mm x L 15 mm	ID 1264352-10 ID 1264352-11	10 or 100

<sup>1)</sup> 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 *Rotary encoders with functional safety* 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


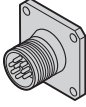

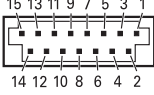




**For more mounting information and mounting aids, see the Mounting Instructions and the Encoders for Servo Drives brochure. The installation can be inspected with the PWM 21 and the ATS software (see document 1082415).**

# Electrical connection

## Pin assignment

### Pin layout

8-pin M12 flange socket					15-pin PCB connector						
											
Encoder											
	Power supply				Serial data transmission				Other signals <sup>1)</sup>		
M12	8	2	5	1	3	4	7	6	/	/	
15	13	11	14	12	7	8	9	10	5	6	
	U <sub>P</sub>	Sensor U <sub>P</sub>	0V	Sensor 0V	DATA	$\overline{\text{DATA}}$	CLOCK	$\overline{\text{CLOCK}}$	T <sup>+</sup> <sup>2)</sup>	T <sup>-</sup> <sup>2)</sup>	
	Brown/ Green	Blue	White/ Green	White	Gray	Pink	Violet	Yellow	Brown	Green	

<sup>1)</sup> Only with output cables inside the motor housing

<sup>2)</sup> Connections for external temperature sensor; evaluation optimized for KTY 84-130 (see *Temperature measurement in motors* in the *Encoders for Servo Drives* brochure)



#### More information:


For encoder cables, connecting cables, and adapter cables, see the *Cables and Connectors* brochure (ID 1206103-xx).


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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.



#### Further information:

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

- Brochure: *Encoders for Servo Drives* 208922-xx
- Brochure: *Interfaces of HEIDENHAIN Encoders* 1078628-xx
- Brochure: *Cables and Connectors* 1206103-xx
- Operating instructions: *ECI 1119, EQI 1131 Functional Safety* 1363898-xx
- Mounting Instructions: *ECI 1119, EQI 1131* 1359816-xx
- Technical Information document: *Safety-Related Position Measuring Systems* 596632
- For implementation in a safe control or inverter: Specification: 533095
- and *Supplementary Measures Catalog (SIL 3, PL e)*: 1000344