



HEIDENHAIN

Product Information

ECI 119 Absolute Rotary Encoder

November 2010

ECI 119 Rotary encoders without integral bearing for integration in motors

Hollow through shaft Ø 50 mm

Inductive scanning principle



mm Tolerancing ISO 8015 ISO 2768 - m H < 6 mm: ±0.2 mm

- \square = Bearing
- \bigotimes = Required mating dimensions
- \oplus = Cylinder head screw ISO 4762-M3 with ISO 7092 (3x) washer. Tightening torque 0.9±0.05 Nm
- @ = SW 2.0 (6x). Evenly tighten crosswise with increasing tightening torque; final tightening torque 0.5 ±0.05 Nm
- Image: Book and Control and
- (9) = Compensation of mounting tolerances and thermal expansion, no dynamic motion
- Image: Bernet State S
- Required mounting frame for output cable with cable clamp (accessory). Bending radius of connecting wires min. R3

Direction of shaft rotation for output signals as per the interface description

	Absolute	
	Singleturn	
	ECI 119	
Absolute position values	EnDat 2.1	EnDat 2.1
Order designation*	EnDat 01	EnDat 21
Positions per revolution	524288 (19 bits)	
Elec. permissible speed/ Deviations ¹⁾	$\leq 3750 \text{ min}^{-1}/\pm 128 \text{ LSB}$ $\leq 6000 \text{ min}^{-1}/\pm 512 \text{ LSB}$	\leq 6000 min ⁻¹ (for continuous position value)
Calculation time $\ensuremath{t_{\text{cal}}}$	≤ 8 µs	
Incremental signals	∼ 1 V _{PP}	-
Line counts	32	-
Cutoff frequency –3 dB	≥ 6 kHz typical	-
System accuracy	± 90"	
Power supply	5V±5%	
Power consumption (maximum)	≤ 0.85 W	
Current consumption (typical)	135 mA (without load)	
Electrical connection	PCB connector, JAE, 15-pin	
Shaft	Hollow through shaft D = 50 mm	
Mech. permissible speed n	$\leq 6000 \text{ min}^{-1}$	
Moment of inertia of rotor	$63 \cdot 10^{-6} \text{kgm}^2$	
Permissible axial motion of measured shaft	± 0.3 mm	
Vibration 55 to 2000 Hz Shock 6 ms	\leq 300 m/s ² (EN 60068-2-6) \leq 1000 m/s ² (EN 60068-2-27)	
Max. operating temperature	115 °C	
Min. operating temperature	-20 °C	
Protection EN 60529	IP 20 when mounted	
Weight	Approx. 0.14 kg	

* Please select when ordering ¹⁾ Velocity-dependent deviation between the absolute and incremental signals

Mounting Information

The ECI 119 is an encoder without integral bearing. This means that mounting and operating conditions influence the functional reserves of the encoder. It is essential to ensure that the specified mating dimensions and tolerances are maintained in all operating conditions.

The following in particular must be kept in mind:

- Axial runout of flange mounting surface
- Radial runout of the motor shaftMaintaining the scanning gap (a), while
- taking into account the superimposition of motions, such as:
 - The length relation of the motor shaft and housing under temperature influence (T₁; T₂; α1; α2) depending on the position of the fixed bearing (b)
 The bearing play (Cx)
- Nondynamic shaft offsets due to load (X₁)
- The effect of engaging motor brakes (X₂)

The application analysis must result in values within specification under all operating conditions (above all under max. load and at minimum and maximum operating temperature for the measured

- max. runout of the motor shaft
- max. runout of the motor shaft with respect to the mounting surface
- max. scanning gap (a)

• minimum scanning gap (a)

and under consideration of the signal amplitude (by inspecting the scanning gap at room temperature) by means of ATS software.

Furthermore, the general mechanical and electrical information in the current "Position Encoders for Servo Drives" brochure must be kept in mind!



Mounting/Removal Preparing Installation

Align

Place the rotary encoder flat with the flange side on a clean, even surface (e.g. a granite plate). The shaft detent (arrow) must be disabled, i.e. the encoder shaft must move freely within the encoder housing.



Lock

Press the encoder housing (stator) against the supporting surface and tighten the locking ring by turning it clockwise until it is **finger tight**.



Ready for mounting

The rated scanning gap is set now. The encoder shaft is locked and the connector is blocked.



Check

Ensure the correct position of the locking ring. The ring ends must lie between the encoder shaft and the clamping ring (no overhang permitted).



Mounting/Removing the Rotary Encoder

Slide on the encoder

Slide the encoder into the mating shaft; do not jam it. Apply pressure only on the encoder shaft (clamping ring).



Screw on

Fasten the encoder housing with three screws and washers.

- M3 screws; head $\emptyset \le 5.5$ mm
- Washers as per ISO 7092
- Tightening torque 0.9 \pm 0.05 Nm (with torque wrench)

If required, fasten the clamp of the output cable. Appropriate tools are available from HEIDENHAIN.

Evenly tighten crosswise the clamping screws (SW 2.0, 6x60°) with increasing tightening torque. Do not exert additional axial pressure; final tightening torque =





Release the lock

Clamp the shaft

0.5 ± 0.05 Nm.

Turn the locking ring counterclockwise up to the stop (snap-in point). The locking ring is now in its operating position: the connector is accessible.

Removing the Rotary Encoder

The encoder is removed in the opposite sequence with a loosened shaft lock. Remount only if the encoder and mounting parts are in faultless condition.



Checking the Mounting

Examination with ATS software

(At room temperature, $U_P = 5 \text{ V}$) Start the ATS software.



Rotary encoder inspection is supported as of ATS version 2.2.00. The software version can be called over "Help" in the menu bar.



Connect the testing cable

(JAE 15-pin plug connector; ensure proper polarization). Check the mounting quality by means of the ATS software.



Establish the connection: Select " Connect encoder" and enter the ID number. Then select " Connect."



Select ExI check under Mounting.

PS Disconnect encoder	
/ Base functions	
Position display	
O Incremental signal diaptay	
Capitag ancoder memory	
Comparison of encoder memory	
Voltage display	
/ Disgnostics	
Absolute/incremental deviation	
/ Mounting	
Bell check	
2 Ed mounting	
Configuration	
Configure hardware	
Sa Language selection	
A Manage product keys	

Press "Next."

ExI mounting check
fut step: Connect the encoder
Please connect the cable to the encoder.
Supply voltage to be set: 5.0 V
(i) The encoder is concernity not being neuroned. A concept source cable is required
9
🔉 Warning: If the supply valtage to be set does not match the connected encoder, the encoder,
interface card or PC could be become damaged!
Info Next > Cancel

Check " scanning gap."

Important note

A signal amplitude deviating from 100 % limits permissible axial motion for operation. 5 % deviation means a reduction of 0.03 mm of the permissible axial motion for operation.

" Scanning gap" check is finished. Then select " Mounting quality." To do so, rotate the motor slowly.

Ext mounting check
2nd step: Checking the scanning gap : Measurement is running
Peak to peak amplitude
Content peak to geak amplitude [*4]: 102.87 20 80 120 180
Min. peak to geak amplitude [5]; Min. peak to geak incr. amplitude [Vpp];
Max, peak to peak amplitude [1]: Max, peak to peak inct, amplitude [Vpp]:
Nounting quality
E-faint: Perminsible meaning quality: 99% - 100%. Result: Mounting quality [1]:
Lagbook Status Mourting Dasity Restant End

Eximounti	ng check		
Zud step: Check	ng the scanning gap : Nearmer	neat is running	
Peak-to-peak an	plitude		
Current peak to	peak amplitude [%]: 192.76		
20	80	120	100
Min. peak.to-pea	k amplitude (%): 102.65	llin, peak-to-peak ince, amplitude	[Vpg]: 1.82
Max, peak-te-pe	ak amplitude (%): 102.93	Hax, peakte-peak incr. amplitud	(Vpp]:1.02
The particular sector of the particular se	wak-to-pook amplitude should l	ee in the range 80% to 120%.	
Mounting quality	0.00000-00-00		
Peta Resu	R: Permissible mounting qualit I:	Y: 90% - 100%	
Het Het	ming quality (24):		

ECI 119 618500-02 😰

Check the mounting quality.

Important note

The mounting quality must lie within 95% to 100%. A mounting quality of < 95% indicates an inadequate mounting situation. If necessary, check the mating dimensions and repeat the mounting procedure.



The detailed results of all measurements are saved in the log file through the **logbook**. It is possible to enter comments.

ExI mounting check
Result logging
Comment:
lia and a second se
Is the state of the second sec
Ok Carcel

Note

The measurement results (amplitude, mounting quality, etc.) can be called over the **log file**. The log file is in the ATS program folder and has to be called using the Explorer.

🗲 Enthruntingtogf in tet - Editor	
Data Baahatan Puntas Andris I	
- current value [%]: 102.31	1
- Maximum value [%] 102.87	
Mounting quality:	
- Limite:	
- Lower Ime (%): 90	
- Opper limit [%; 100	
- Hesult	
Mounting quality [%]: 96.2	
Comment:	
This area is for users comment and will be stored together	
with the Exi-check data into the logner.	
131 08 2010 14 28 571	
Encode: SND: 527130796	
Encode (D: 61850).02	
Incremental signals TVac	
- Besuit	
- Minimum value (Vool: 1.02	
- Maximum value (Vool: 1.03	
Peak to peak amplitude:	
- Limits:	
 Lower limit of mean value 1%1: 80 	
Upper limit of mean value [16]: 120	
- Result:	
- Minimum value (%): 101.52	
- current value [%]: 102.20	
- Maximum value (%): 102.87	
Mounting quality:	
- Limits:	
- Lower limit (%): 90	
- Upper limit (%): 100	
- Result:	
Mounting quality [%]: 98.2	
Comment	

Active warnings and alarms can be displayed over "Status."

Encoder status	
Errors:	
Wanahrge	
None	

Inspection complete. Select "End" or "Restart." Remove the test cable.

Mount the connecting cable.

Exi mounting check				
2nd stop: Checking the scanning gap	p : Measurement is	running		
Back to see the section of				
Consult and to and southeds lith	100.27			
20	80	120	190	
Min. peak-to-peak amplitude [5]: 10	11.13 Nin. p	eak-to-peak incr. amplitude (V	/pp]= 1.01	
Max, peak-to-peak amplitude [5]: W	17.72 Max, p	eak-to-peak incr. amplitude p	Vpp@1.03	
Max, peak-to-peak amplitude [14] N	97.32 Max, p ide should be in t	eak.to-peak incr. amplitude p ke range 80% te 120%.	Vpp8:1.07	
Max, poakto-poak amplitude (%): N	97.32 Max, p rde should be in 1	eak.to.peak incr. amplitude p ke range 80% te 120%.	Vpg: 1.07	
Max, peakto-peak amplitude (%): 16 1) The peak-to-peak amplitude Homring quality Default: Permissible men Resett	97,72 Max, p ade should be in t rrfing quality: 99%	eak.to.peak incr. amplitude p ko range 80% to 120%, - 180%	Vppg:1.03	
Max, peak-to-peak amplitude (*); # The peak-to-peak amplitu Houring quality Perfault: Parmissible mea Result: Houring quality (*);	07.72 Max, p ade should be in th rrling quality: 90% 18.0	reak-to-peak incr. amplitude p ho range 80% te 120%, - 180%	уруфт.03	
Max, peak-to-peak amplitude (*)4. 8 (1) The peak-to-peak amplitu Howning quality Default: Permissible men Rewelt: Mounting quality (*)4	97,72 Max. p nde sheuld be in t rriing quality: 90% 16.0	reakto-peak incr. amplitude j ke range 80% te 120%, - 180%	Vp481.03	
Max, peak-to-peak amplitude (*)4, %	97,72 Max. p nde sheuld be in t nting quality: 90% 18.0	reak to peak incr. anglitulo (he range 80% to 120%, - 180%	Vpp6:1.07	

Accessories

Adjusting and testing package

HEIDENHAIN offers an adjusting and testing package for diagnosis and adjustment of HEIDENHAIN encoders with absolute interface.

- IK 215 PC expansion board
- ATS adjusting and testing software



	IK 215
Encoder input	 EnDat 2.1 or EnDat 2.2 (absolute value with/without incremental signals) FANUC serial interface Mitsubishi High Speed Serial Interface SSI
Interface	PCI bus, Rev. 2.1
System requirements	 Operating system: Windows XP (Vista upon request) Approx. 20 MB free space on the hard disk
Signal subdivision for incremental signals	Up to 65536-fold
Dimensions	100 mm x 190 mm

	ATS
Languages	Choice between English or German
Features	 Position display Connection dialog Diagnostics Mounting wizard for ECI/EQI Additional functions (if supported by the encoder) Memory contents

Encoder cable

For IK 215, incl. 3 adapter connectors, 12-pin and 3 adapter connectors, 15-pin ID 621742-01

15-pin adapter connector

Three connectors for replacement ID 528694-02

Mounting aid

For JAE connector ID 592818-01

Electrical Connection

Cables inside the motor housing

With one connector 15-pin (male), with cable clamp		EPG (16 x AWG30/7) Cable Ø 4.5 mm	640067-N3
Length 0.3 m	W		

Pin layout

15-pin PC	15 13 11 9 7 5 3 1 15 13 11 9 7 5 3 1 14 12 10 8 6 4 2											
	Power supply				Incremental signals ¹⁾				Absolute position values (EnDat)			
	13	11	14	12	1	2	3	4	7	8	9	10
	U _P	Sensor UP	0V •	Sensor 0V	A+	A-	B+	B-	DATA	DATA	CLOCK	CLOCK
	Brown/ Green	Blue	White/ Green	White	Green/ Black	Yellow/ Black	Blue/ Black	Red/Black	Gray	Pink	Violet	Yellow

 $\mathbf{U}_{\mathbf{P}}$ = power supply

Sensor: The sensor line is connected internally with the corresponding power line.

Vacant pins or wires must not be used! ¹⁾ Only with ordering designation EnDat01

HEIDENHAIN

DR. JOHANNES HEIDENHAIN GmbH Dr.-Johannes-Heidenhain-Straße 5 83301 Traunreut, Germany 2 +49 8669 31-0 FAX +49 8669 5061 E-mail: info@heidenhain.de

www.heidenhain.de

For more information

• Brochure: Position Encoders for Servo Drives