

# HEIDENHAIN



Product Information

**ECN 1313**

**ECN 1325**

**ERN 1321**

**ERN 1387**

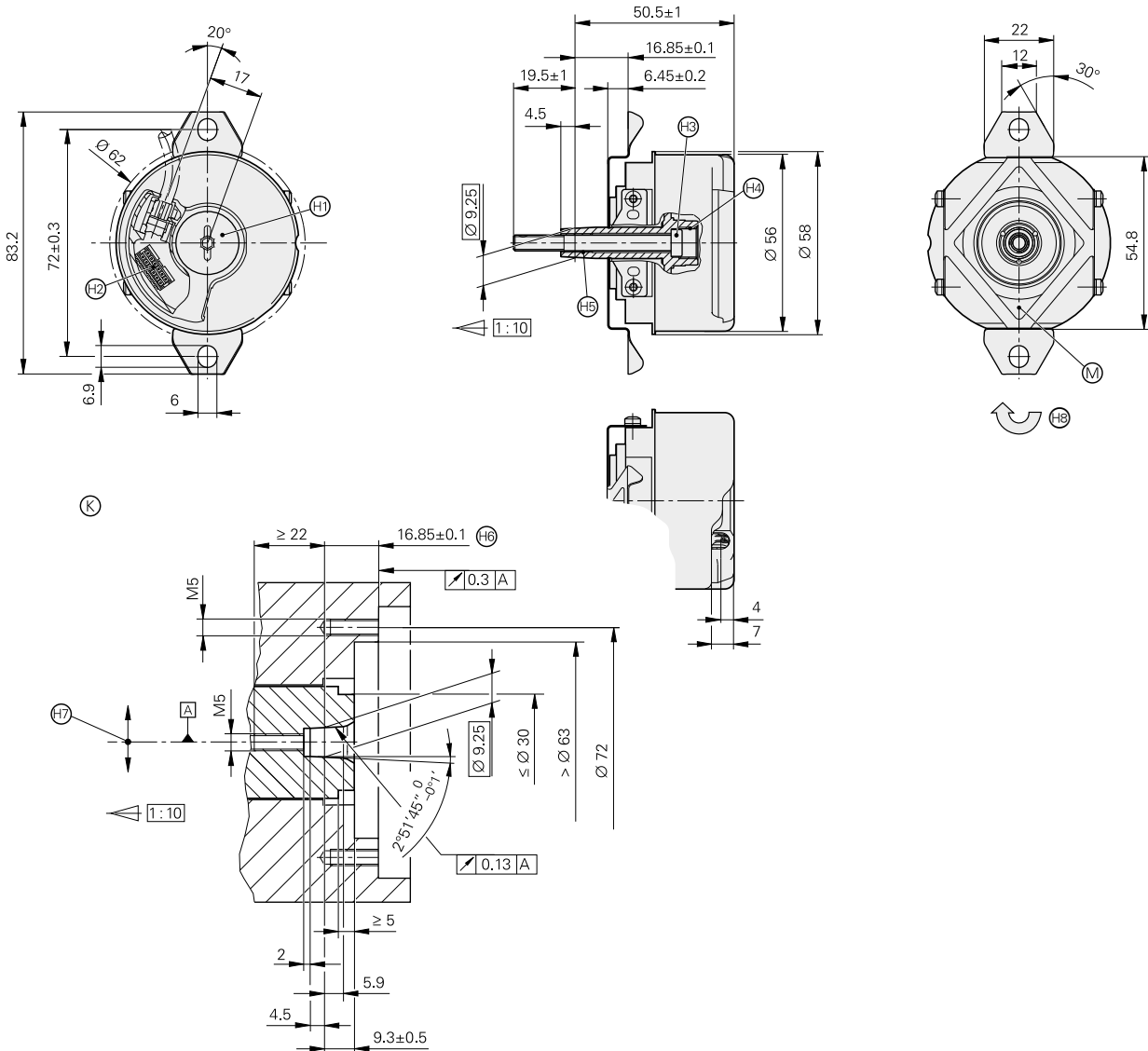
Rotary Encoders with  
Plane-Surface Coupling  
for Elevator Servo Drive  
Control


October 2013

# ECN/ERN 1300 series

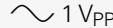

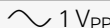
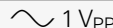

## Rotary Encoders with integral bearings for elevator technology

- Simple installation
- Rigid shaft coupling
- Plane-surface coupling for large mounting tolerances
- Uniform dimensions for various interfaces



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

- ▣ = Bearing of mating shaft
- ▣ = Bearing of encoder
- ⊙ = Required mating dimensions
- ⊙ = Measuring point for operating temperature
- ⊙ = Screw plug, widths A/F 3 and 4, tightening torque 5+0.5 Nm
- ⊙ = 12-pin PCB connector
- ⊙ = Self-tightening screw M5 x 50 DIN 6912 SW4, tightening torque 5 +0.5 Nm
- ⊙ = M10 back-off thread
- ⊙ = M6 back-off thread
- ⊙ = Max. permissible tolerance with moving motor shaft ± 1.5
- ⊙ = Max. permissible static radial offset of motor shaft in indicated direction ± 0.13 mm
- ⊙ = Direction of scanning unit motion for output signals in accordance with interface description

	Absolute		Incremental	
	ECN 1325	ECN 1313	ERN 1387	ERN 1321
Interface <sup>1)</sup>	EnDat 2.2		 1 V <sub>PP</sub>	 TTL
Ordering designation	EnDat22	EnDat01	–	
Position values/rev	33554432 (25 bits)	8192 (13 bits)	Z1 track <sup>3)</sup>	–
Elec. permissible speed/ Deviation <sup>2)</sup>	≤ 12000 min <sup>–1</sup> (for continuous position value)	≤ 1500 min <sup>–1</sup> /± 1 LSB ≤ 12000 min <sup>–1</sup> /± 50 LSB	–	
Calculation time t <sub>cal</sub> Clock frequency	≤ 7 μs ≤ 8 MHz	≤ 9 μs ≤ 2 MHz	– –	
Incremental signals <sup>1)</sup>	–	 1 V <sub>PP</sub>	 1 V <sub>PP</sub>	 TTL
Line count*/ system accuracy	2048/± 20″		2048/± 20″	1024/± 64″ 2048/± 32″ 4096/± 16″ 5000/± 13″
Reference mark	–		One	
Cutoff frequency –3 dB	–	≥ 400 kHz	≥ 210 kHz	–
Scanning frequency Edge separation	– –		– –	≤ 300 kHz ≥ 0.35 μs
Electrical connection Via PCB connector	Rotary encoder: 12-pin Temperature sensor <sup>4)</sup> : 4-pin	12-pin	14-pin	12-pin
Voltage supply	3.6 V to 14 V DC		5 V ± 0.25 V	5 V ± 0.5 V
Power consumption <sup>1)</sup> (maximum)	3.6 V: ≤ 600 mW 14 V: ≤ 700 mW		–	–
Current consumption	5 V: 85 mA (typical, without load)		≤ 130 mA (without load)	≤ 120 mA (without load)
Stator coupling	Plane-surface coupling			
Shaft	Taper shaft Ø 9.25 mm; taper 1:10			
Mech. permissible speed n	≤ 12000 min <sup>–1</sup>			
Starting torque	≤ 0.01 Nm (at 20 °C)			
Moment of inertia of rotor	2.6 · 10 <sup>–6</sup> kgm <sup>2</sup>			
Permissible axial motion of measured shaft <sup>5)</sup>	± 1.5 mm			
Radial runout of the measured shaft	0.13 mm (static, radial offset ± 0.13 mm)			
Vibration 55 to 2000 Hz Shock 6 ms	≤ 300 m/s <sup>26)</sup> (EN 60 068-2-6) ≤ 2000 m/s <sup>2</sup> (EN 60 068-2-27)			
Operating temperature	–40 °C to 115 °C		–40 °C to 120 °C	
Protection EN 60529	IP 40 when mounted			
Weight	Approx. 0.25 kg			

\* Please select when ordering

<sup>1)</sup> See catalog: *Interfaces of HEIDENHAIN Encoders*

<sup>2)</sup> Speed-dependent deviations between the absolute value and incremental signal

<sup>3)</sup> One sine and one cosine signal per revolution

<sup>4)</sup> Evaluation optimized for KTY 84-130

<sup>5)</sup> Compensation of mounting tolerances and thermal expansion, no dynamic motion

<sup>6)</sup> As per standard for room temperature; the following applies for operating temperature

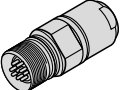


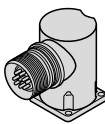

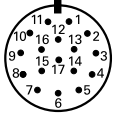
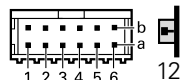



Up to 100 °C: ≤ 300 m/s<sup>2</sup>




Up to 115 °C or 120 °C: ≤ 150 m/s<sup>2</sup>

# Electrical connection

## Pin layouts

### ECN 1313 pin layout

17-pin coupling or flange socket M23										12-pin PCB connector			
     													
	Voltage supply					Incremental signals <sup>1)</sup>				Absolute position values			
	7	1	10	4	11	15	16	12	13	14	17	8	9
 12	1b	6a	4b	3a	/	2a	5b	4a	3b	6b	1a	2b	5a
	U <sub>P</sub>	Sensor U <sub>P</sub>	0 V	Sensor 0 V	Internal shield	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

Other signals	
5	6
	/
 12	/
	Brown <sup>2)</sup>
	White <sup>2)</sup>

**Cable shield** connected to housing; **U<sub>P</sub>** = power supply voltage; **T** = Temperature  
**Sensor:** The sensor line is connected in the encoder with the corresponding power line.  
 Vacant pins or wires must not be used!

<sup>1)</sup> Only with ordering designations EnDat 01 and EnDat 02

<sup>2)</sup> Only with output cables inside the motor





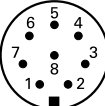

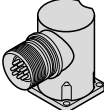
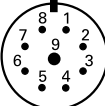

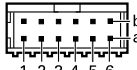





<sup>3)</sup> Connections for external temperature sensor; connection in the M23 flange socket

<sup>4)</sup> **ECI 1118 EnDat 22:** Vacant


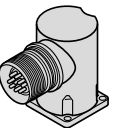
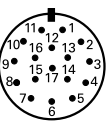

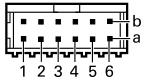





<sup>5)</sup> Only EnDat 22, except ECI 1118

<sup>6)</sup> White with M23 flange socket / Green with M12 flange socket

### ECN 1325 pin layout

<b>8-pin coupling or flange socket</b> M12					<b>9-pin flange socket</b> M23							
    					  							
<b>4-pin PCB connector</b>  1 2      b a 4					<b>12-pin PCB connector</b>  1 2 3 4 5 6      b a 12							
	Voltage supply				Absolute position values				Other signals <sup>3)</sup>			
 M12	8	2	5	1	3	4	7	6	/	/	/	/
 M23	3	7	4	8	5	6	1	2	/	/	/	/
 4	/	/	/	/	/	/	/	/	1a	1b	/	/
 12	1b	6a	4b	3a	6b	1a	2b	5a	/	/	/	/
	U <sub>P</sub>	Sensor U <sub>P</sub> <sup>4)</sup>	0 V	Sensor 0 V <sup>4)</sup>	DATA	DATA	CLOCK	CLOCK	T <sup>5)</sup>	T <sup>-5)</sup>	T <sup>3) 5)</sup>	T <sup>-3) 5)</sup>
	Brown/ Green	Blue	White/ Green	White	Gray	Pink	Violet	Yellow	Brown	Green	Brown	<sup>6)</sup>

## ERN 1321 pin layout

<b>Output cable for ERN 1321 in the motor</b> ID 667343-01					<b>17-pin M23 flange socket</b>   			<b>12-pin PCB connector</b>  					
	Voltage supply				Incremental signals						Other signals		
	7	1	10	4	15	16	12	13	3	2	5	6	8/9/11/ 14/17
	2a	2b	1a	1b	6b	6a	5b	5a	4b	4a	/	/	3a/3b
	<b>U<sub>P</sub></b> 	<b>Sensor U<sub>P</sub></b>	<b>0V</b> 	<b>Sensor 0V</b>	<b>U<sub>a1</sub></b>	<b><math>\overline{U_{a1}}</math></b>	<b>U<sub>a2</sub></b>	<b><math>\overline{U_{a2}}</math></b>	<b>U<sub>a0</sub></b>	<b><math>\overline{U_{a0}}</math></b>	<b>T<sup>1)</sup></b>	<b>T<sup>-1)</sup></b>	<b>Vacant</b>
	Brown/ Green	Blue	White/ Green	White	Brown	Green	Gray	Pink	Red	Black	Brown <sup>1)</sup>	White <sup>1)</sup>	/

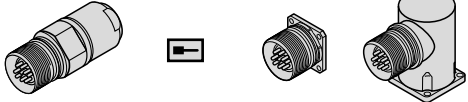
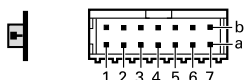



**Cable shield** connected to housing; **U<sub>P</sub>** = power supply voltage

**Sensor:** The sensor line is connected in the encoder with the corresponding power line

Vacant pins or wires must not be used!

<sup>1)</sup> Only for encoder cable inside the motor housing

## ERN 1387 pin layout

<b>17-pin coupling or flange socket</b> M23 						<b>14-pin PCB connector</b> 						
	Voltage supply					Incremental signals						
	7	1	10	4	11	15	16	12	13	3	2	
	1b	7a	5b	3a	/	6b	2a	3b	5a	4b	4a	
	<b>U<sub>P</sub></b>	<b>Sensor U<sub>P</sub></b>	<b>0V</b>	<b>Sensor 0V</b>	<b>Internal shield</b>	<b>A+</b>	<b>A-</b>	<b>B+</b>	<b>B-</b>	<b>R+</b>	<b>R-</b>	
	Brown/Green	Blue	White/Green	White	/	Green/Black	Yellow/Black	Blue/Black	Red/Black	Red	Black	

	Other signals					
	14	17	9	8	5	6
	7b	1a	2b	6a	/	/
	<b>C+</b>	<b>C-</b>	<b>D+</b>	<b>D-</b>	<b>T<sup>1)</sup></b>	<b>T<sup>-1)</sup></b>
	Gray	Pink	Yellow	Violet	Green	Brown

**Cable shield** connected to housing;

**U<sub>P</sub>** = Power supply; **T** = Temperature

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

Vacant pins or wires must not be used!

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

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# HEIDENHAIN

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## DR. JOHANNES HEIDENHAIN GmbH

Dr.-Johannes-Heidenhain-Straße 5

**83301 Traunreut, Germany**

☎ +49 8669 31-0

FAX +49 8669 5061

E-mail: [info@heidenhain.de](mailto:info@heidenhain.de)

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This Product Information supersedes all previous editions, which thereby become invalid. The basis for ordering from HEIDENHAIN is always the Product Information valid when the contract is made.

### More information

- Catalog: *Position Encoders for Servo Drives*
- Catalog: *Rotary Encoders*
- Catalog: *Interfaces of HEIDENHAIN Encoders*