



HEIDENHAIN



**Functional
Safety**

Product Information

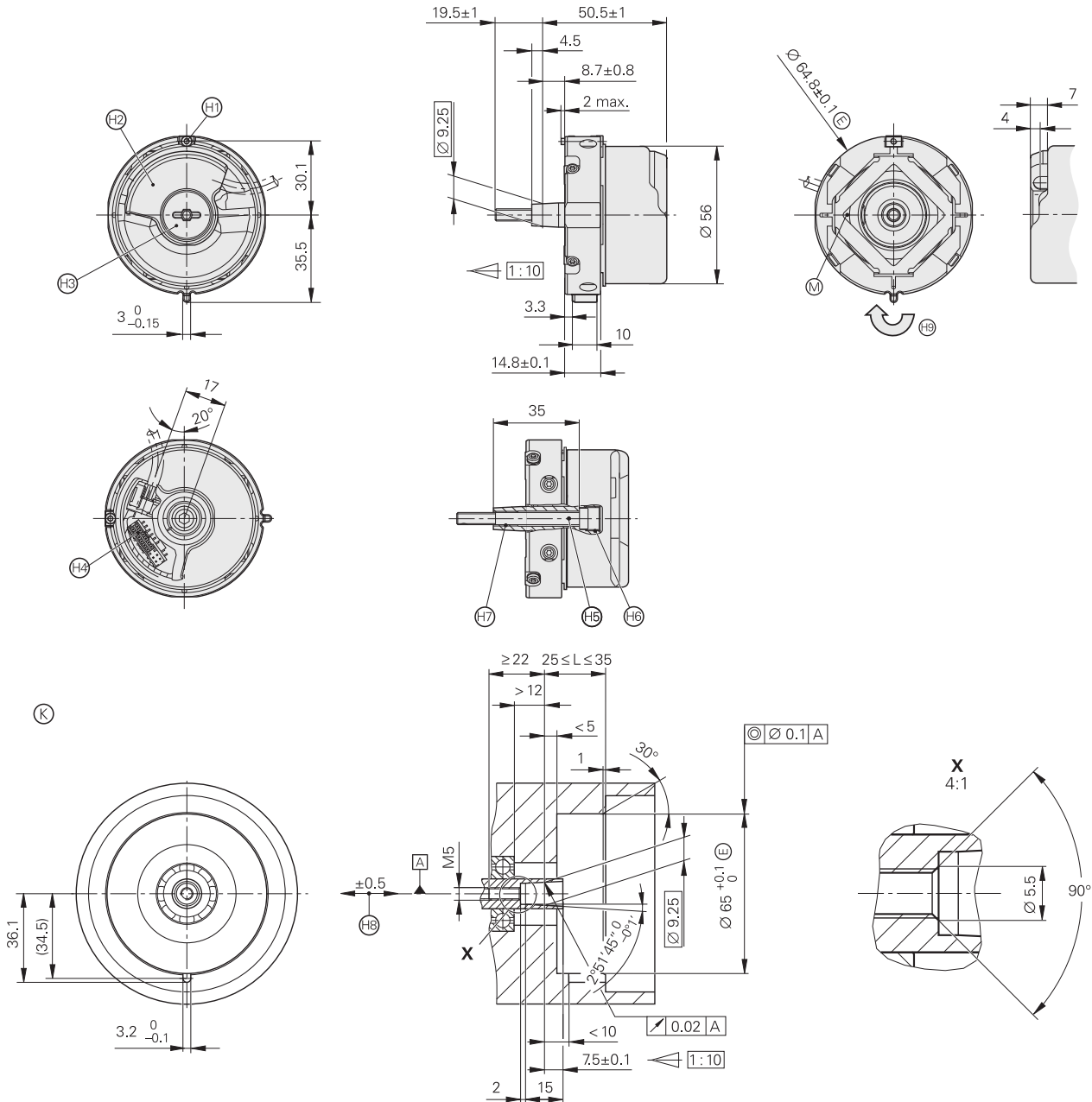
ECN 1319 EQN 1331

Rotary Encoders with Taper Shaft
for Safety-Related Applications

ECN 1319 EQN 1331

Rotary Encoders for Absolute Position Values with Safe Singleturn Information

- Installation diameter 65 mm
- Expanding ring coupling 07B
- Taper shaft 65B



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

- ▣ = Bearing of mating shaft
- Ⓢ = Required mating dimensions
- Ⓜ = Measuring point for operating temperature
- Ⓢ = Clamping screw for coupling ring, width A/F 2, tightening torque: 1.25–0.2 Nm
- Ⓢ = Die-cast cover
- Ⓢ = Screw plug, widths A/F 3 and 4, tightening torque 5+0.5 Nm
- Ⓢ = PCB connector
- Ⓢ = Screw M5 x 50 DIN 6912 width A/F 4 with materially bonding anti-rot. lock, tightening torque 5+0.5 Nm
- Ⓢ = Back-off thread M10
- Ⓢ = Back-off thread M6
- Ⓢ = Compensation of mounting tolerances and thermal expansion, no dynamic motion permitted
- Ⓢ = Direction of shaft rotation for output signals as per the interface description

Specifications	Absolute	
	ECN 1319 Singletum	EQN 1331 Multitum
Functional Safety for applications up to	<ul style="list-style-type: none"> SIL 2 according to EN 61508 (further basis for testing: EN 61800-5-2) Category 3 PL d according to EN ISO 13849-1:2008 <p>Safe in the singleturn range</p>	
PFH	$\leq 10 \times 10^{-9}$ (probability of dangerous failure per hour)	
Safe position	<i>Device:</i> $\pm 1.75^\circ$ ¹⁾ (safety-relevant measuring step SM = 0.7°) <i>Mechanical coupling:</i> $\pm 2^\circ$ (fault exclusion for loosening of shaft and stator coupling)	
Absolute position values	EnDat 2.2	
Ordering designation	EnDat 22	
Position values per revolution	524 288 (19 bits)	
Revolutions	-	4096 (12 bits)
Electrically permissible speed	$\leq 15000 \text{ min}^{-1}$ (for continuous position value)	
Calculation time t_{cal}	$\leq 7 \mu\text{s}$	
System accuracy	$\pm 20''$	
Power supply	DC 3.6 to 14 V	
Power consumption ²⁾ (maximum)	At 3.6 V: $\leq 600 \text{ mW}$ At 14 V: $\leq 700 \text{ mW}$	At 3.6 V: $\leq 700 \text{ mW}$ At 14 V: $\leq 800 \text{ mW}$
Current consumption (typical)	At 5 V: 85 mA (without load)	At 5 V: 105 mA (without load)
Electrical connection via PCB connector	<i>Rotary encoder:</i> 12-pin <i>Temperature sensor:</i> ³⁾ 4-pin	
Cable length	$\leq 100 \text{ m}$	
Shaft	Taper shaft $\varnothing 9.25 \text{ mm}$; taper 1:10	
Mechanically permissible speed	$\leq 15000 \text{ min}^{-1}$	$\leq 12000 \text{ min}^{-1}$
Starting torque at 20 °C	$\leq 0.01 \text{ Nm}$	
Moment of inertia of rotor	$2.6 \times 10^{-6} \text{ kgm}^2$	
Angular acceleration of rotor	$\leq 1 \times 10^5 \text{ rad/s}^2$	
Natural frequency of stator coupling	$\geq 1800 \text{ Hz}$	
Permissible axial motion of measured shaft	$\pm 0.5 \text{ mm}$	
Vibration 10 to 2 000 Hz ⁴⁾ Shock 6 ms	$\leq 300 \text{ m/s}^2$ (EN 60 068-2-6) ⁵⁾ $\leq 2000 \text{ m/s}^2$ (EN 60 068-2-27)	
Max. operating temperature	115 °C	
Min. operating temperature	-40 °C	
Relative humidity	$\leq 93 \%$ (40 °C/21 d according to EN 60068-2-78) without condensation	
Protection EN 60 529	IP 40 when mounted (after mounting by the customer, the encoder must be protected against intrusion of dust in accordance with IP 6x or liquid)	
Weight	Approx. 0.25 kg	

1) Further tolerances may occur in the subsequent electronics after the position value comparison (contact the manufacturer of the subsequent electronics)

2) See General Electrical Information in *Position Encoders for Servo Drives* catalog or at www.heidenhain.de





3) Evaluation optimized for KTY 84; see *Position Encoders for Servo Drives* catalog

4) 10 to 55 Hz constant over distance 4.9 mm peak to peak


5) As per standard for room temperature; the following applies for operating temperature: Up to 100 °C: $\leq 300 \text{ m/s}^2$; to 115 °C: $\leq 150 \text{ m/s}^2$

Electrical Connection


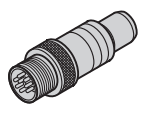


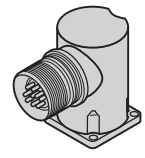




Cables

PUR connecting cables \varnothing 6 mm; 8-pin [(4×0.14 mm ²) + (4×0.34 mm ²)]		M12 connector, 8-pin	M23 connector, 9-pin
Complete with connector (female) and M12 coupling (male), 8 pins each		368330-xx	745796-xx
Complete with 8-pin M12 connector (female) and 15-pin D-sub connector (female)		533627-xx	-
Complete with 8-pin M12 connector (female) and 15-pin D-sub connector (male)		524599-xx	-
With one 8-pin M12 connector (female)		634265-xx ¹⁾	-

1) Connecting element must be suitable for the maximum clock frequency used

EPG cable inside motor housing \varnothing 4.5 mm; [6×2×0.09 mm ²]		
Complete with PCB connector (12-pin and 4-pin) and M23 right-angle socket (male), 9-pin		746 254-01

Pin layout

8-pin M12 coupling		9-pin M23 right-angle socket						
								
	Power supply				Absolute position values			
 M12	8	2	5	1	3	4	7	6
 M23	3	7	4	8	5	6	1	2
	U _p	Sensor U _p	0 V	Sensor 0 V	DATA	DATA	CLOCK	CLOCK
	Brown/Green	Blue	White/Green	White	Gray	Pink	Violet	Yellow

Cable shield connected to housing; **Up** = Power supply

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

Vacant pins or wires must not be used!

Note for safety-related applications: Only completely assembled HEIDENHAIN cables are qualified. Exchange connectors or modify cables only after consultation with HEIDENHAIN Traunreut.

HEIDENHAIN

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

www.heidenhain.de

Related documents: Adhere to the information in the following documents to ensure the correct and intended operation of the encoder:

- Catalog: *Position Encoders for Servo Drives*: 208 922-xx
- Mounting Instructions for *ECN 1325, EQN 1337*: 686 161-xx
- Technical Information: *Safety-Related Position Encoders*: 596 632-xx

For implementation in a control or inverter:

- Specification for Safe Control/Inverter: 533 095