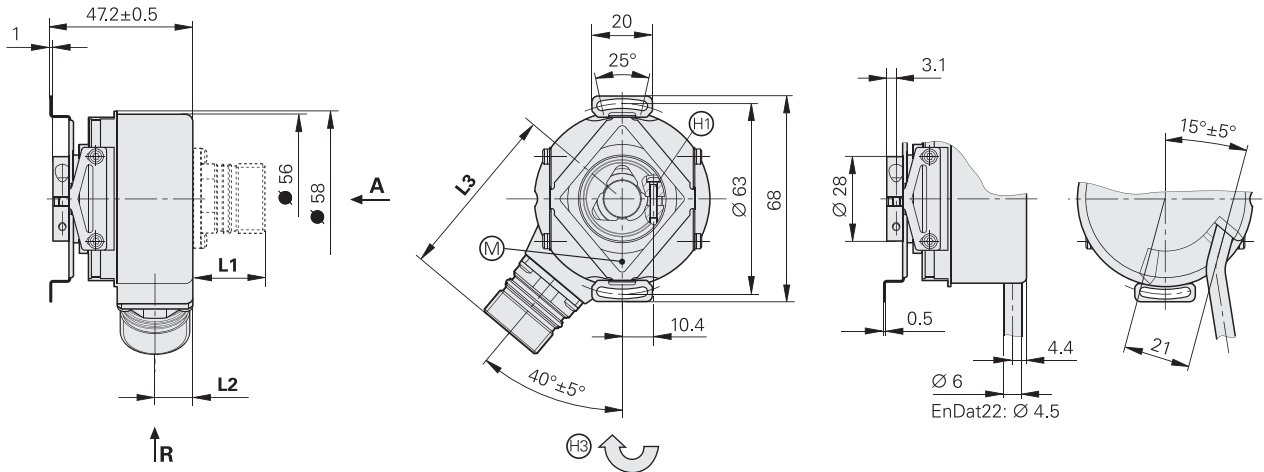


# ECN/EQN/ERN 400 Series

- Rotary encoders with mounted stator coupling
- Blind hollow shaft or hollow through shaft

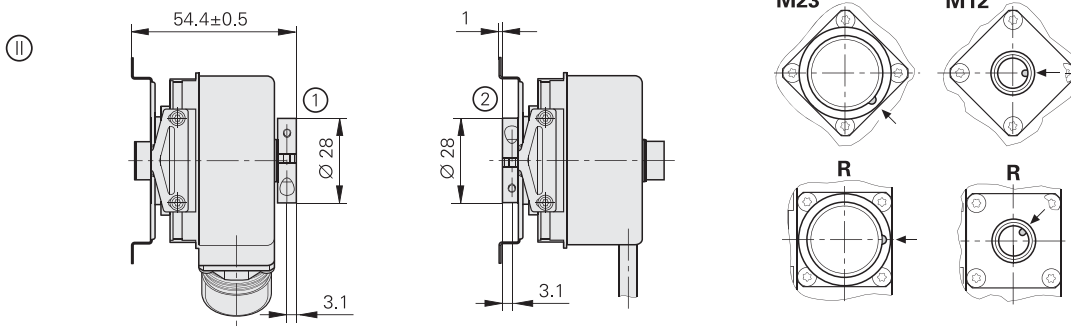


## Blind hollow shaft



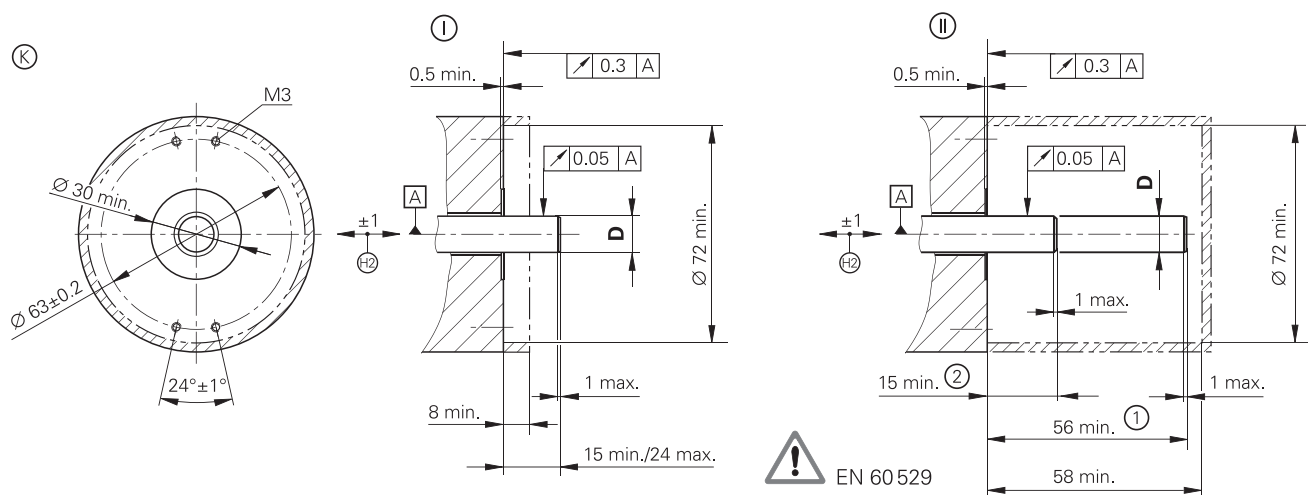
## Hollow through shaft

Connector coding  
A = axial, R = radial



Flange socket		
	M12	M23
L1	14	23.6
L2	12.5	12.5
L3	48.5	58.1

D
Ø 8g7 $\oplus$
Ø 12g7 $\oplus$



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

- ▣ = Cable radial, also usable axially
- ⊠ = Bearing of mating shaft
- ⊙ = Required mating dimensions
- ⊕ = Measuring point for operating temperature
- ⊖ = Clamping screw with X8 hexalobular socket
- ⊗ = Compensation of mounting tolerances and thermal expansion, no dynamic motion permitted
- ⊘ = Direction of shaft rotation for output signals as per the interface description
- ① = Clamping ring on housing side (condition upon delivery)
- ② = Clamping ring on coupling side (optionally mountable)

	Incremental			
	ERN 420	ERN 460	ERN 430	ERN 480
<b>Incremental signals</b>	□□ TTL		□□ HTL	~ 1 V <sub>PP</sub> <sup>1)</sup>
Line counts*	250 500			–
	<b>1000 1024 1250 2000 2048 2500 3600 4096 5000</b>			
Reference mark	One			
Cutoff frequency –3 dB	–			≥ 180 kHz
Scanning frequency	≤ 300 kHz			–
Edge separation a	≥ 0.39 μs			–
<b>System accuracy</b>	1/20 of grating period			
<b>Power supply</b>	5 V DC ± 10 %	10 to 30 V DC	10 to 30 V DC	5 V DC ± 10 %
<b>Current consumption</b> without load	120 mA	100 mA	150 mA	120 mA
<b>Electrical connection*</b>	<ul style="list-style-type: none"> <li>• <b>Flange socket</b> M23, radial and axial (with blind hollow shaft)</li> <li>• <b>Cable</b> 1 m, <b>without connecting element</b></li> </ul>			
<b>Shaft*</b>	<b>Blind hollow shaft</b> or <b>hollow through shaft; D = 8 mm</b> or <b>D = 12 mm</b>			
<b>Mech. perm. speed n<sup>2)</sup></b>	≤ 6000 min <sup>-1</sup> /≤ 12000 min <sup>-1</sup> <sup>3)</sup>			
<b>Starting torque</b>	At 20 °C	Blind hollow shaft: ≤ 0.01 Nm Hollow through shaft: ≤ 0.025 Nm		
	Below –20 °C	≤ 1 Nm		
<b>Moment of inertia</b> of rotor	≤ 4.3 · 10 <sup>-6</sup> kgm <sup>2</sup>			
<b>Permissible axial motion of measured shaft</b>	± 1 mm			
<b>Vibration</b> 55 Hz to 2000 Hz	≤ 300 m/s <sup>2</sup> ; flange socket version: 150 m/s <sup>2</sup> (EN 60068-2-6)			
<b>Shock</b> 6 ms/2 ms	≤ 1000 m/s <sup>2</sup> /≤ 2000 m/s <sup>2</sup> (EN 60068-2-27)			
<b>Max. operating temp.<sup>2)</sup></b>	100 °C	70 °C	100 °C <sup>4)</sup>	
<b>Min. operating temp.</b>	Flange socket or fixed cable: –40 °C Moving cable: –10 °C			
<b>Protection</b> EN 60529	IP 67 at housing (IP 66 with hollow through shaft); IP 64 at shaft inlet			
<b>Weight</b>	Approx. 0.3 kg			

**Bold:** These preferred versions are available on short notice

\* Please select when ordering

1) Restricted tolerances: Signal amplitude 0.8 to 1.2 V<sub>PP</sub>

2) For the correlation between the operating temperature and the shaft speed or supply voltage, see *General Mechanical Information*

3) With two shaft clamps (only for hollow through shaft)

4) 80° for ERN 480 with 4096 or 5000 lines


**Absolute**
**Singleturn**
**ECN 425**
**ECN 413**
**ECN 413**

<b>Absolute position values*</b>	<b>EnDat 2.2</b>	<b>EnDat 2.2</b>	<b>SSI</b>
Ordering designation	EnDat 22	EnDat 01	SSI 39r1
Positions per revolution	33554432 (25 bits)	8192 (13 bits)	
Revolutions	–		
Code	Pure binary		Gray
Elec. permissible speed Deviations <sup>1)</sup>	$\leq 12000 \text{ min}^{-1}$ for continuous position value	<i>512 lines:</i> $\leq 5000/12000 \text{ min}^{-1}$ $\pm 1 \text{ LSB}/\pm 100 \text{ LSB}$ <i>2048 lines:</i> $\leq 1500/12000 \text{ min}^{-1}$ $\pm 1 \text{ LSB}/\pm 50 \text{ LSB}$	$\leq 12000 \text{ min}^{-1}$ $\pm 12 \text{ LSB}$
Calculation time $t_{\text{cal}}$	$\leq 7 \mu\text{s}$	$\leq 9 \mu\text{s}$	$\leq 5 \mu\text{s}$
<b>Incremental signals</b>	Without	$\sim 1 V_{\text{PP}}^{2)}$	
Line counts*	–	<b>512</b> 2048	<b>512</b>
Cutoff frequency –3 dB	–	<i>512 lines:</i> $\geq 130 \text{ kHz}$ ; <i>2048 lines:</i> $\geq 400 \text{ kHz}$	
Scanning frequency	–	–	
Edge separation a	–	–	
<b>System accuracy</b>	$\pm 20''$	<i>512 lines:</i> $\pm 60''$ ; <i>2048 lines:</i> $\pm 20''$	
<b>Power supply*</b>	<b>3.6 to 14 V DC</b>	<b>3.6 to 14 V DC</b>	5 V DC $\pm 5\%$ or <b>10 to 30 V DC</b>
Power consumption (maximum)	3.6 V: $\leq 600 \text{ mW}$ 14 V: $\leq 700 \text{ mW}$	5 V: $\leq 800 \text{ mW}$ 10 V: $\leq 650 \text{ mW}$ 30 V: $\leq 1000 \text{ mW}$	
Current consumption (typical; without load)	5 V: 85 mA	5 V: 90 mA 24 V: 24 mA	
<b>Electrical connection*</b>	<ul style="list-style-type: none"> <li>• <b>Flange socket</b> M12, radial</li> <li>• Cable 1 m, with M12 coupling</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Flange socket</b> M23, radial</li> <li>• Cable 1 m, with M23 coupling or without connecting element</li> </ul>	
<b>Shaft*</b>	<b>Blind hollow shaft or hollow through shaft; D = 8 mm or D = 12 mm</b>		
<b>Mech. perm. speed <math>n^{3)}</math></b>	$\leq 6000 \text{ min}^{-1}/\leq 12000 \text{ min}^{-1 4)}$		
<b>Starting torque</b>	At 20 °C Below –20 °C	<i>Blind hollow shaft:</i> $\leq 0.01 \text{ Nm}$ <i>Hollow through shaft:</i> $\leq 0.025 \text{ Nm}$ $\leq 1 \text{ Nm}$	
<b>Moment of inertia</b> of rotor	$\leq 4.3 \cdot 10^{-6} \text{ kgm}^2$		
<b>Permissible axial motion of measured shaft</b>	$\pm 1 \text{ mm}$		
<b>Vibration</b> 55 Hz to 2000 Hz <b>Shock</b> 6 ms/2 ms	$\leq 300 \text{ m/s}^2$ ; <i>flange socket version:</i> $150 \text{ m/s}^2$ (EN 60068-2-6) $\leq 1000 \text{ m/s}^2/\leq 2000 \text{ m/s}^2$ (EN 60068-2-27)		
<b>Max. operating temp.</b> <sup>3)</sup>	100 °C		
<b>Min. operating temp.</b>	<i>Flange socket or fixed cable:</i> –40 °C <i>Moving cable:</i> –10 °C		
<b>Protection</b> EN 60529	IP 67 at housing; IP 64 at shaft inlet		
<b>Weight</b>	Approx. 0.3 kg		

**Bold:** These preferred versions are available on short notice

\* Please select when ordering

1) Velocity-dependent deviations between the absolute value and incremental signal

2) Restricted tolerances: Signal amplitude 0.8 to 1.2  $V_{\text{PP}}$

Multitum		
EQN 437	EQN 425	EQN 425
<b>EnDat 2.2</b>	<b>EnDat 2.2</b>	<b>SSI</b>
EnDat 22	EnDat 01	SSI 41r1
33 554 432 (25 bits)	8 192 (13 bits)	
4 096		
Pure binary		Gray
$\leq 12\,000 \text{ min}^{-1}$ for continuous position value	<i>512 lines:</i> $\leq 5\,000/10\,000 \text{ min}^{-1}$ $\pm 1 \text{ LSB}/\pm 100 \text{ LSB}$ <i>2048 lines:</i> $\leq 1\,500/10\,000 \text{ min}^{-1}$ $\pm 1 \text{ LSB}/\pm 50 \text{ LSB}$	$\leq 12\,000 \text{ min}^{-1}$ $\pm 12 \text{ LSB}$
$\leq 7 \mu\text{s}$	$\leq 9 \mu\text{s}$	$\leq 5 \mu\text{s}$
Without	$\sim 1 \text{ V}_{\text{PP}}^{2)}$	
–	<b>512</b> 2048	<b>512</b>
–	<i>512 lines:</i> $\geq 130 \text{ kHz}$ ; <i>2048 lines:</i> $\geq 400 \text{ kHz}$	
–	–	
–	–	
$\pm 20''$	<i>512 lines:</i> $\pm 60''$ ; <i>2048 lines:</i> $\pm 20''$	
<b>3.6 to 14 V DC</b>	<b>3.6 to 14 V DC</b>	5 V DC $\pm 5\%$ or <b>10 to 30 V DC</b>
3.6 V: $\leq 700 \text{ mW}$ 14 V: $\leq 800 \text{ mW}$		5 V: $\leq 950 \text{ mW}$ 10 V: $\leq 750 \text{ mW}$ 30 V: $\leq 1\,100 \text{ mW}$
5 V: 105 mA		5 V: 120 mA 24 V: 28 mA
<ul style="list-style-type: none"> <li>• <b>Flange socket</b> M12, radial</li> <li>• Cable 1 m, with M12 coupling</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Flange socket</b> M23, radial</li> <li>• Cable 1 m, with M23 coupling or without connecting element</li> </ul>	

3) For the correlation between the operating temperature and the shaft speed or power supply, see *General Mechanical Information*

4) With 2 shaft clamps (only for hollow through shaft)

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