Product Overview

Rotary Encoders for the Elevator Industry
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The demands on elevator technology have risen steadily in the past years: Not only are faster speeds and greater conveyor heights required, but also compact designs and low operating costs. And the most comfortable of rides: smooth starting and continuous acceleration are as much a prerequisite for a pleasant ride without undesirable loads as are gentle braking and traverse to the exact target position.

The **drive control plays** an important role here. The trend continues toward gearless drive machines, which offer a series of economical and environmental advantages:
- Elevator systems with little vibration or noise
- Reduced spatial requirements permit machine-room-less (MRL) elevators
- Comfortable ride properties
- Low energy consumption
- Freedom from maintenance and oil

Permanent-magnet synchronous motors are often used because of the greater power density. Depending on the control strategy, these types of motors require absolute position information for correctly controlling the rotor position. This position information can be provided by an absolute rotary encoder or an incremental rotary encoder with commutation signals, for example.

In addition, these demanding drive strategies mostly require high-resolution rotary encoders, which are integrated as position encoders in the control loop in order to ascertain the actual shaft speed. Absolute rotary encoders with the purely serial EnDat 2.2 interface are perfectly suited for this purpose. Besides high resolution, they offer other functions such as diagnostic capabilities and temperature evaluation.

In order to fulfill the great expectations place on functionality and reliability, as well as to make a suitable and well thought-out system integration possible, rotary encoders used in elevator technology must fulfill very specific requirements. This applies to the other fields of application for rotary encoders in elevator technology as well: **digital shaft resolution** and the controlling of **door drives**.
Overview
Rotary encoders for drive control in elevators

In its product program, HEIDENHAIN offers solutions tailored to the drive technology in elevators, providing the greatest possible uniformity of mechanical mounting combined with very different electrical interfaces. Technical details, such as rigid shaft connections, rotary encoder couplings with high mechanical natural frequencies or expanded runout tolerances, simple mounting, powerful bidirectional interfaces (EnDat with analog signals or purely digital with comprehensive diagnostic capabilities), and an electronic ID label for absolute rotary encoders represent some of the HEIDENHAIN standard. This can cover the entire spectrum of the usual drive amplifiers on the market as well as customary types of motors.

Rotary encoders from HEIDENHAIN are characterized by excellent signal quality and high accuracy, and as such are a guarantee for high-quality velocity control and exact positioning.

ECN/ERN 1300 and ECN/ERN 400 series with expanding ring coupling (with high natural frequency of the stator coupling)

ECN/ERN 1300 and ECN/ERN 400 series with plane-surface coupling (expanded runout and mounting tolerances)

ECN/ERN 100 series
Hollow shaft with inside diameter of 50 mm

ERN incremental rotary encoders
ECN absolute singleturn encoders

<table>
<thead>
<tr>
<th>Model</th>
<th>Outside dia. 2)</th>
<th>Shaft version</th>
<th>Degree of protection</th>
<th>Incremental signals</th>
<th>Signal periods per revolution</th>
<th>Absolute position values</th>
<th>Position values per revolution</th>
<th>Commutation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERN 120</td>
<td>87 mm</td>
<td>Hollow through shaft Ø 20, 25, 30, 38 or 50 mm</td>
<td>IP 64</td>
<td>TTL, HTL, 1 VPP</td>
<td>1000 to 5000</td>
<td>–</td>
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<td>ERN 130</td>
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<td>IP 64</td>
<td>2048</td>
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<td>ECN 125</td>
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<td></td>
<td>IP 64</td>
<td>–</td>
<td>EnDat</td>
<td>8 192 (13 bits)</td>
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<tr>
<td>ERN 1321</td>
<td>58 mm</td>
<td>Taper shaft Ø 9.25 taper 1:10</td>
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<td>TTL</td>
<td>1024 to 10000</td>
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<td>ERN 1387</td>
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</table>

1) Plane-surface coupling upon request; 2) Rotary encoder housing
Rotary encoders for digital shaft resolution

The shaft resolution serves to brake the elevator cabin without jerk in a timely manner, as well as to position it exactly. The position of the cabin is captured at all times and transmitted to the control. Incremental rotary encoders, and especially absolute rotary encoders from HEIDENHAIN are well suited to this purpose. They make digital shaft resolution possible, with its distinct advantages regarding control technology and mounting efforts.

The special benefit of position measurement with absolute multiturn rotary encoders is the constant availability of the absolute position value of the passenger cabin, even after an interruption in power. And since the actual position value is permanently on hand, the cabin can be moved directly to the entrance.

An RIQ 400 or a bearing assembly with an EQN 400 is offered specifically for shaft resolution. The cabin position is often measured through toothed belts and deflection pulleys. A bearing assembly decouples the large forces that often occur here from the precision bearing of the rotary encoder, thereby preventing an overload on the encoder.

### EQN/IQN absolute multiturn rotary encoders with mounted stator coupling

**RIQ absolute multiturn rotary encoders for separate shaft coupling**

<table>
<thead>
<tr>
<th>Model</th>
<th>External dia.</th>
<th>Shaft version</th>
<th>Degree of protection</th>
<th>Incremental signals</th>
<th>Signal periods per revolution</th>
<th>Absolute position values</th>
<th>Position values per revolution</th>
<th>Revolutions</th>
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<tbody>
<tr>
<td>EQN 425</td>
<td>58 mm</td>
<td>Blind hollow shaft or hollow through shaft Ø 12 mm</td>
<td>IP 64</td>
<td>1 VPP</td>
<td>512 or 2048</td>
<td>EnDat</td>
<td>8 192 (13 bits)</td>
<td>4 096</td>
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<tr>
<td>IQN 425</td>
<td>58 mm</td>
<td>Solid shaft Ø 10 mm (clamping flange) or Ø 6 mm (synchro flange)</td>
<td>IP 66</td>
<td>1 VPP</td>
<td>32</td>
<td>EnDat</td>
<td>8 192 (13 bits)</td>
<td>4 096</td>
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<tr>
<td>RIQ 425</td>
<td>58 mm</td>
<td>Solid shaft Ø 10 mm (clamping flange) or Ø 6 mm (synchro flange)</td>
<td>IP 66</td>
<td>1 VPP</td>
<td>32</td>
<td>EnDat</td>
<td>8 192 (13 bits)</td>
<td>4 096</td>
</tr>
</tbody>
</table>

1) Rotary encoder housing
Overview
Rotary encoders for door drives

Shorter stopping times, which result in an increase in the number of people that can be carried, are the goal for office skyscrapers with a large amount of pedestrian traffic. Correct operation of the elevator doors is a particularly critical topic in managing the pedestrian traffic of a large office building.

Controlled door drives are necessary for quick and exact opening and closing of the doors with a minimum of noise. Compact rotary encoders from HEIDENHAIN are especially suited for speed and position feedback. Their mounting diameter of less than 40 mm makes them ideal for when space is limited.

<table>
<thead>
<tr>
<th>Model</th>
<th>Outside dia.</th>
<th>Shaft version</th>
<th>Degree of protection</th>
<th>Incremental signals</th>
<th>Signal periods per revolution</th>
<th>Absolute position values</th>
<th>Position values per revolution</th>
<th>Revolutions</th>
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<tr>
<td>ERO 1420</td>
<td>38.4 mm</td>
<td>Hollow through shaft Ø 4, 6 or 8 mm</td>
<td>IP 00</td>
<td>TTL</td>
<td>512, 1 000 or 1 024</td>
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<td>Blind hollow shaft Ø 6 mm</td>
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<td>100 to 3600</td>
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<td>–</td>
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<td>Blind hollow shaft Ø 6 mm</td>
<td>IP 64</td>
<td>TTL</td>
<td>100 to 3600</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>ERN 1080</td>
<td>36.5 mm</td>
<td>Blind hollow shaft Ø 6 mm</td>
<td>IP 64</td>
<td>TTL</td>
<td>100 to 3600</td>
<td>–</td>
<td>–</td>
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<tr>
<td>ERN 1023</td>
<td>35 mm</td>
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<td>IP 64</td>
<td>TTL</td>
<td>500 to 2048</td>
<td>TTL</td>
<td>3 signals for block commutation</td>
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<td>ECI 1118</td>
<td>37 mm</td>
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<td>IP 20</td>
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<td>EnDat</td>
<td>262 144 (18 bits)</td>
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<td>EQI 1130</td>
<td>37 mm</td>
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<td>–</td>
<td>–</td>
<td>–</td>
<td>4096</td>
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</tr>
</tbody>
</table>

1) Rotary encoder housing
2) In the mounted condition
More information

For more detailed information such as general technical descriptions, mounting instructions, technical specifications and exact dimensions, please refer to our brochures and product information documents, or visit us on the Internet at www.heidenhain.de.

Product Information
ECN 413
ECN 425
ERN 421
ERN 487

Contents:
Rotary encoders for drive control in elevators (IP 64 protection)

Product Information
ECN 1313
ECN 1325
ERN 1321
ERN 1387

Contents:
Rotary encoders for servo drive control in elevators

Brochure
Encoders for Servo Drives

Contents:
Rotary encoders
Angle encoders
Linear encoders

Brochure
Rotary Encoders

Contents:
Incremental rotary encoders
ERN, ROD
Absolute Rotary Encoders
ECN, EQN, ROC, ROQ

Brochure
Interfaces of HEIDENHAIN Encoders

Comprehensive descriptions of all available interfaces as well as General Electrical Information is included in the Interfaces brochure.

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