



**HEIDENHAIN**



Product Overview

## **Rotary Encoders for the Elevator Industry**

October 2007

# Rotary Encoders for the Elevator Industry

Demands on elevator technology have risen consistently in the past years: Not only are faster speeds and greater conveyor heights being demanded, but also compact designs and low operating costs. But of course passenger comfort must not suffer. Smooth starting and continuous acceleration are as much a prerequisite for a comfortable ride without unpleasant loads as are gentle braking and exact approach of the target position.

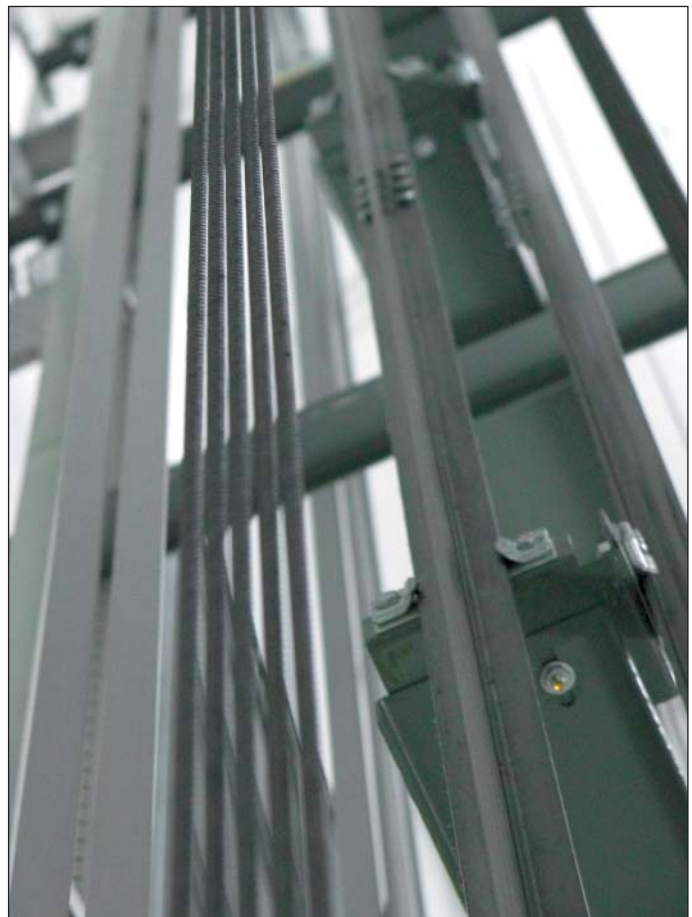
The **drive control** plays an important role in this. Drive technology has changed significantly in recent years due to these demands. The trend continues toward gearless drive machines, which offer a series of economical and environmental advantages:

- Elevator systems with little vibration or noise
- Reduced spatial requirements permit machine-roomless (MRL) elevators
- Comfortable ride properties
- Low energy consumption
- Free of maintenance and oil

Because of the greater power density, permanent-magnet synchronous motors are often used. Depending on the control strategy, these types of motors require absolute position information for correctly controlling the rotor position. This position information can be supplied 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 velocity.

In order to fulfill the great expectations regarding functionality and reliability, and also to make a suitable and well thought-out system integration possible, rotary encoders used in elevator technology must also feature very specific properties. 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, meaning 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, 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 are therefore a guarantee for high-quality velocity control and exact positioning.



ECN/ERN 1300 and ECN/ERN 400 series



ECN/ERN 100 series

### ERN incremental rotary encoders

### ECN absolute singleturn rotary encoders

Model	External diameter	Shaft version	Protection	Incremental signals	Signal periods/revolution	Absolute position values	Position values/rev Commutation
ERN 120 ERN 130 ERN 180	87 mm	Hollow through shaft Ø 20, 25, 30, 38 or 50 mm	IP 64	□ TTL	1 000 to 5 000	–	–
□ HTL							
~ 1 V <sub>PP</sub>							
ECN 113				~ 1 V <sub>PP</sub>	2 048	EnDat or SSI	8 192 (13 bits)
ECN 125				–	–	EnDat	33 554 435 (25 bits)
ERN 1321 ERN 421	65 mm	Taper shaft Ø 9.25 Taper 1:10	ECN/ERN 400: IP 64 ECN/ERN 1300: IP 40	□ TTL	1 024 to 10 000	–	–
ERN 1326				□ TTL			
ERN 1381 ERN 481				~ 1 V <sub>PP</sub>	512, 1 024, 2 048, 4 096	–	
ERN 1387 ERN 487				~ 1 V <sub>PP</sub>	2 048	~ 1 V <sub>PP</sub>	Z1 track for sine commutation
ECN 1313 ECN 413							512 or 2 048
ECN 1325				–	–	EnDat	33 554 435 (25 bits)

# 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 clear 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.

A special bearing assembly is offered for the shaft resolution, since the position of the cabin is often determined with toothed belts and sheaves. A bearing assembly decouples the large forces that often occur here from the precision bearing of the rotary encoder, thereby preventing an overload.



Bearing assembly with EQN 400



ROQ 400 series (clamping flange)



EQN 400 series

## EQN absolute multiturn rotary encoders with mounted stator coupling ROQ absolute multiturn rotary encoders for separate shaft coupling

Model	External diameter	Shaft version	Protection	Incremental signals	Signal periods/revolution	Absolute position values	Position values per revolution	Revolutions
EQN 425	58 mm	Blind hollow shaft or hollow through shaft Ø 12 mm	IP 64	~ 1 V <sub>pp</sub>	512 or 2048	EnDat	8 192 (13 bits)	4 096
					512	SSI		
EQN 437				–	–	EnDat	33 554 435 (25 bits)	
ROQ 425	58 mm	Solid shaft Ø 10 mm (clamping flange) or Ø 6 mm (synchro flange)	IP 64	~ 1 V <sub>pp</sub>	512 or 2048	EnDat	8 192 (13 bits)	4 096
					512	SSI		
ROQ 437				–	–	EnDat	33 554 435 (25 bits)	

# Overview

## Rotary Encoders for Door Drives

Brief stopping times, which result in an increase in the number of people that can be transported, are the goal for office sky scrapers with a large amount of pedestrian traffic. Correct operation of the elevator doors is an especially 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 reporting the velocity and position. Their mounting diameter of less than 40 mm makes them ideal for when space is limited.



ERO 1420



ECI/EQI 1100 series



ERN 1000 series

### ERO incremental rotary encoders for integration

### ERN incremental rotary encoders

### ECI absolute singleturn rotary encoders

### EQI absolute multiturn encoders

Model	External diameter	Shaft version	Protection	Incremental signals	Signal periods/revolution	Absolute position values	Position values per revolution	Revolutions
<b>ERO 1420</b>	38.4 mm	Hollow through shaft Ø 4, 6 or 8 mm	IP 00	□ TTL	512, 1000 or 1024	–	–	–
<b>ERN 1020</b> <b>ERN 1030</b> <b>ERN 1080</b>	36.5 mm	Blind hollow shaft Ø 6 mm	IP 64	□ TTL □ HTL ~ 1 V <sub>PP</sub>	100 to 3600	–	–	–
<b>ECI 1118</b>	37 mm		IP 20	~ 1 V <sub>PP</sub>	16	EnDat	262 144 (18 bits)	–
				–	–			–
<b>EQI 1130</b>				~ 1 V <sub>PP</sub>	16			4096
			–	–				

# For More Information

For more detailed information, mounting instructions, technical specifications and exact dimensions, as well as descriptions of interfaces, please refer to our brochures and Product Information datasheets, or visit us at [www.heidenhain.de](http://www.heidenhain.de).



Product Information

**ECN 413**  
**ECN 425**  
**ERN 421**  
**ERN 487**

Contents:

Rotary encoders for 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**

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## HEIDENHAIN

**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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[www.heidenhain.de](http://www.heidenhain.de)

