

# Gaining New Impulses.

Precision and reliability from industrial to offshore applications.

Incremental, Absolute, and Cable-Pull Rotary Encoders



Your automation, our passion.

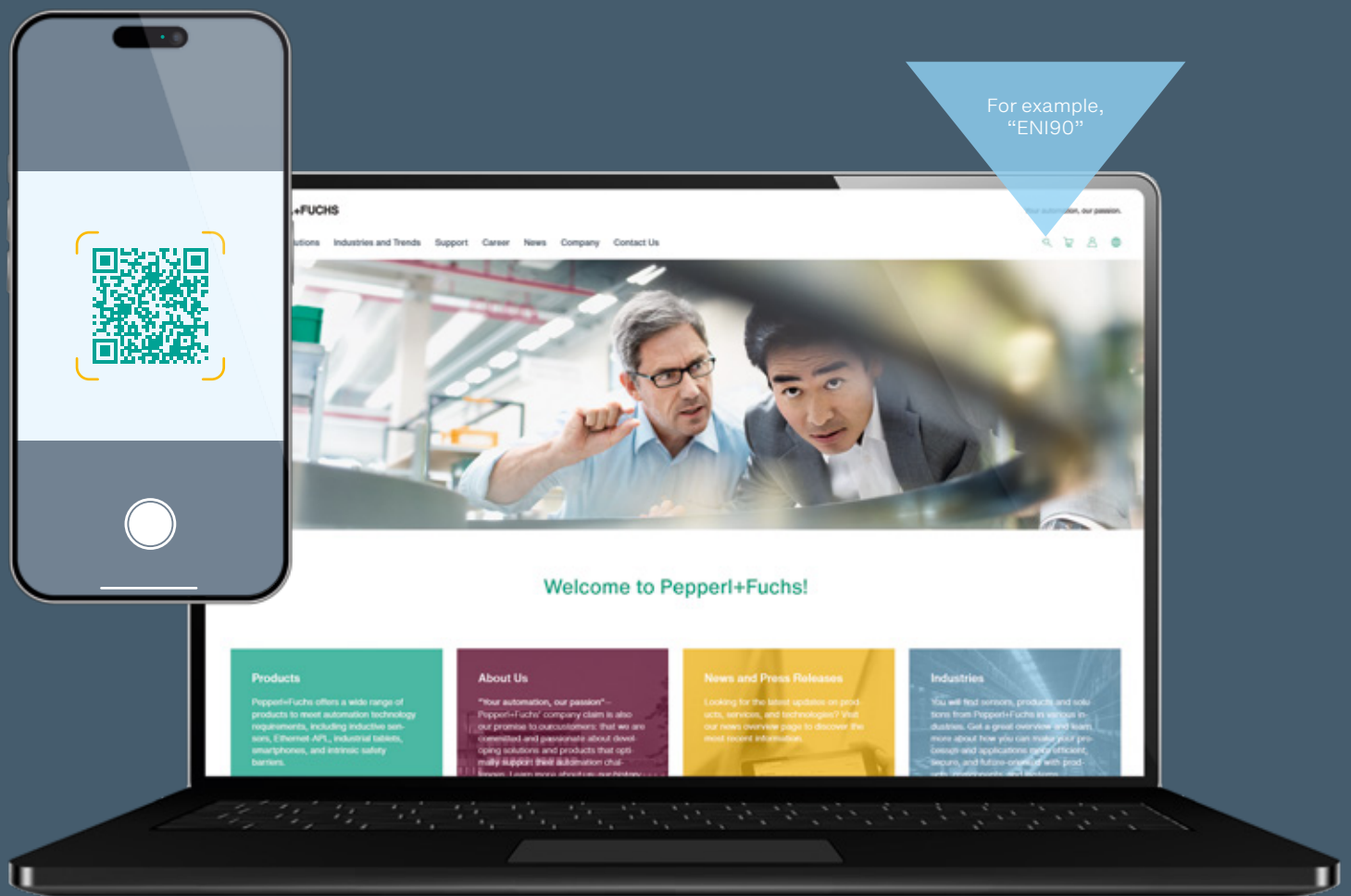
 **PEPPERL+FUCHS**

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Simply scan the respective QR code or enter the order designation in the search field on the Pepperl+Fuchs website and get to your product selection immediately. Order designation can be found in this brochure in the technical data summaries. Or you can navigate through our range of product families and groups. Product selectors help you select the optimal device.



For more information, visit  
[pepperl-fuchs.com/pf-encoder](https://pepperl-fuchs.com/pf-encoder)

# Contents

<b>Industries</b>	<b>4</b>
<b>Product Selector</b>	<b>6</b>
<b>Incremental Rotary Encoders</b>	<b>8</b>
<b>Absolute Rotary Encoders</b>	<b>18</b>
<b>Cable Pulls</b>	<b>26</b>
<b>Accessories</b>	<b>34</b>

## Industries

# Complex Applications Require Reliable Technology

In markets where competition is becoming more and more fierce and requirements ever more exacting, high-performance technology is an increasingly important factor for success. For applications in which reliability, the construction size, and ambient conditions play a role, the compact, rugged sensors from Pepperl+Fuchs offer the ideal solution—for a surprisingly wide range of applications.

### Customized Solutions

At Pepperl+Fuchs, the customer application always takes center stage. Together with our customers, we develop a customized solution that is optimally tailored to the application—even beyond the standard portfolio. We rely on close cooperation and a development process with short paths—for solutions that set new standards and meet the highest requirements. Short order throughput times are guaranteed, as is consistent quality assurance.

### Reliable Technology in Any Environment

As sensor technology for controlling rotary and translatory movements, rotary encoders are a key component of modern automation technology. They detect angles of rotation and recognize variables such as speed, acceleration, and absolute positions. The function of a rotary encoder is to convert these mechanical movements into electrical signals. Pepperl+Fuchs offers a comprehensive portfolio of different rotary encoders that open up a wide range of applications—from industrial to offshore applications and from heavy-duty systems to applications in hazardous areas.

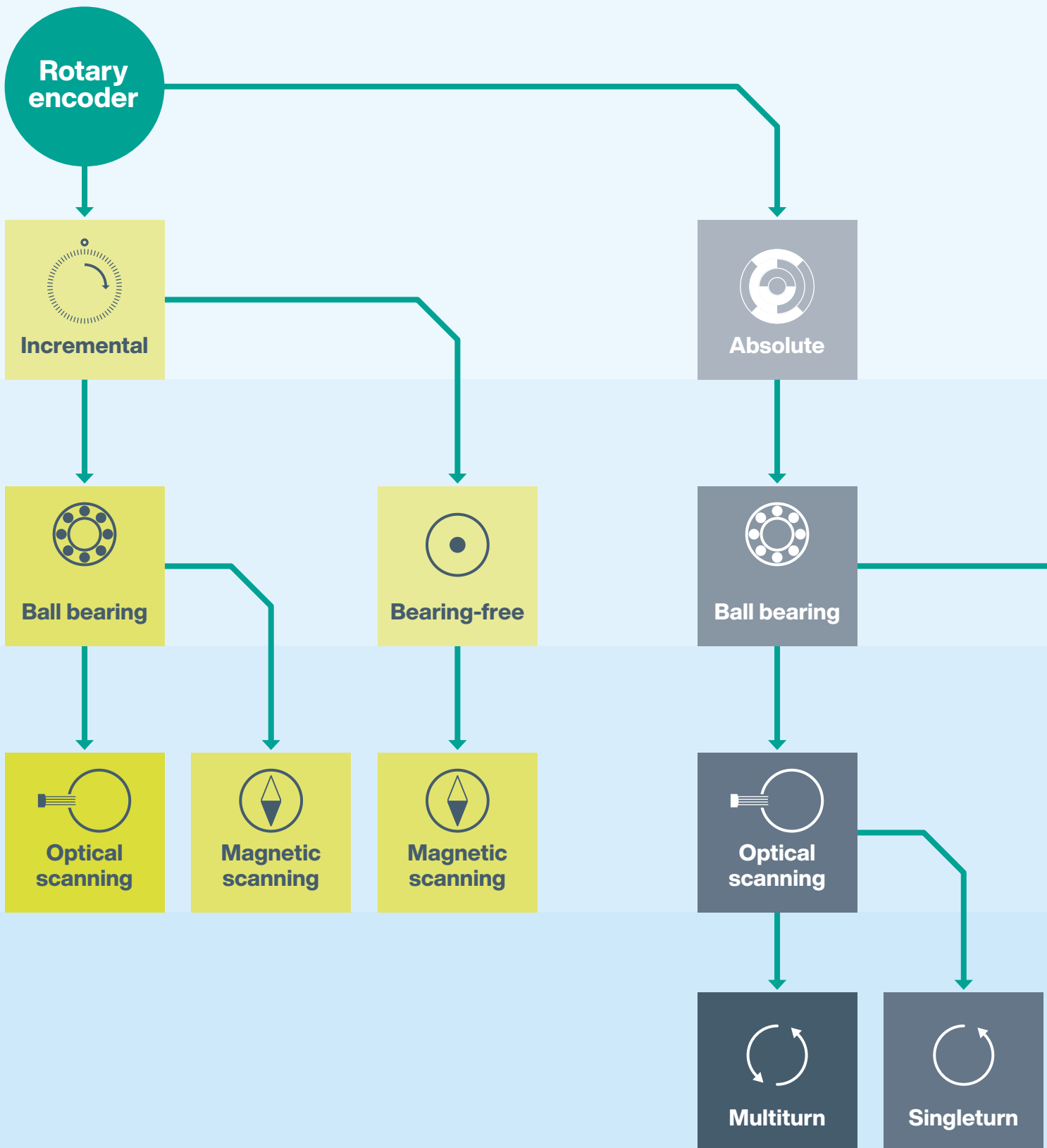
### Typical Industries

- Mechanical and plant engineering
- Mobile equipment
- Renewable energy
- Warehousing and material handling
- Print and paper industry
- Packaging industry
- Automotive industry
- Offshore and shipbuilding
- Oil and gas industry
- Chemical industry
- Doors, gates, and elevators



# The Right Rotary Encoder for Your Application

Every application places different demands on sensor technology. The portfolio of incremental and absolute rotary encoders from Pepperl+Fuchs therefore consists of different versions that can be selected depending on the application requirements. Several established basic technologies are also available.



### Incremental and Absolute Rotary Encoders

Incremental rotary encoders detect a certain number of pulses per shaft revolution. Counting the pulses or measuring the period duration provides information about the speed and angle of the shaft. Absolute rotary encoders output a clearly coded position value for each position. This means that no reference runs are required—neither when switching on the machine nor after a supply voltage failure.

### Ball Bearing and Bearing-Free Rotary Encoders

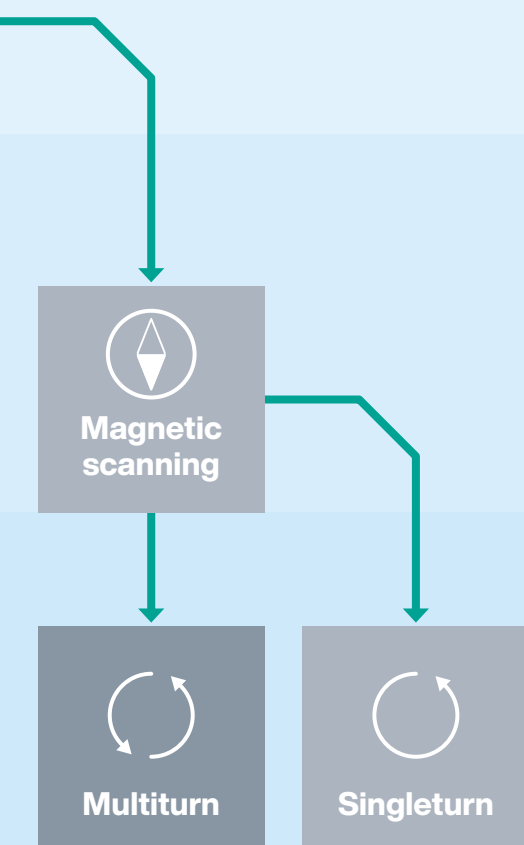
In addition to bearing-mounted rotary encoders, Pepperl+Fuchs also offers a selection of bearing-free rotary encoders. Due to their low installation depth, these sensors enable especially space-saving installation. Because of their noncontact and wear-free scanning, they also guarantee reliable continuous operation even in harsh ambient conditions.

### Optical and Magnetic Scanning

High resolutions can be easily realized with the optical rotary encoders from Pepperl+Fuchs. A rotating code disc is used for this purpose, which ensures periodic modulation of a light current. This is converted into an electrical signal. Rotary encoders based on the magnetic scanning principle with AMR (anisotropic magnetoresistance) and GMR (giant magnetoresistance) effect in combination with Wiegand sensors are characterized by especially robust functionality for use in harsh environments.

### Singleturn and Multiturn Versions

A distinction is made between singleturn and multiturn versions of absolute rotary encoders: With singleturn absolute rotary encoders, the coding starts again at its start value after each full revolution. Multiturn absolute rotary encoders also record the number of revolutions and therefore offer a total resolution of up to 32 bits, depending on the technology.





For more information, visit  
[pepperl-fuchs.com/pf-incr-encoder](https://www.pepperl-fuchs.com/pf-incr-encoder)

## Incremental Rotary Encoders

# Precise Position Detection for Reliable Automation

**Incremental rotary encoders form the bridge between mechanics and electronics. Their performance feature is to detect angles of rotation and measure speeds. They provide precisely the signals that make automatic control of rotating processes possible in the first place. Pepperl+Fuchs offers an extensive rotary encoder portfolio that covers a wide range of application solutions for the most diverse requirements.**

### **Integrated Reliability**

Maximum reaction rate, process reliability, and machine availability are the prerequisites for reliable work processes. The rotary encoders from Pepperl+Fuchs perfectly fit these requirements. They deliver precise measurement results for reliable processes and offer thoroughly robust technology that helps to make costly system downtimes an absolute exception. With very high accuracies and resolutions of up to 50,000 pulses per revolution, each rotary encoder delivers precision exactly as required.

### **Compatibility According to Industry Standards**

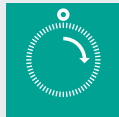
The trend toward ever more compact housing designs is clearly evident in today's mechanical and plant engineering. The incremental rotary encoders from Pepperl+Fuchs accommodate this development. With diameters as small as 40 mm, they are the ideal solution for confined installation conditions. With extremely rugged housings, they guarantee reliable detection even under harsh operating and ambient conditions.

A rotary encoder must not only fit into its environment mechanically. It must also integrate seamlessly into the existing system environment. Pepperl+Fuchs therefore consistently relies on recognized industry standards, for example through connections in the common metric and imperial dimensions, standardized fastenings, and standardized mechanical and electrical interfaces.

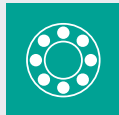
### **Typical Areas of Application**

- Mechanical and plant engineering
- Doors, gates, and elevators
- Print and paper industry
- Warehousing and material handling
- Medical technology
- Packaging industry
- Mobile equipment
- Renewable energies
- Food industry
- Chemical/petrochemical

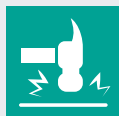
# Reliably Accurate, Flexible in Use



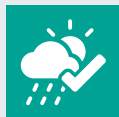
Incremental



Ball bearing



Shock-/vibration-resistant



Heavy duty



Degree of protection



### Superior Technology for High-Precision Scanning

Thanks to BlueBeam technology, the hollow shaft rotary encoders of the ENI90 series are characterized by high signal quality and maximum precision in rotational speed measurement. Three device types and an extensive range of accessories offer almost unlimited configuration options for a wide variety of applications. They prove their worth wherever high-precision speed control of electric motors or generators, for example, is required.

### Maximum Precision, Irrespective of the Version

The basic version ENI90IL is the economical solution for all standard applications. The ENI90PL rotary encoder is designed for demanding environments and offers high resistance to shock and vibration. Its insulated shaft is shielded up to a voltage of 2 kV. An EMC protective circuit guarantees protection of the electronics. The heavy-duty versions ENI90HD and ENI90HO, the offshore version of the ENI90HD, are available for extreme conditions. The devices in this series also have an EMC protective circuit, can withstand very high shaft loads, and are dielectrically strong up to 2.5 kV.

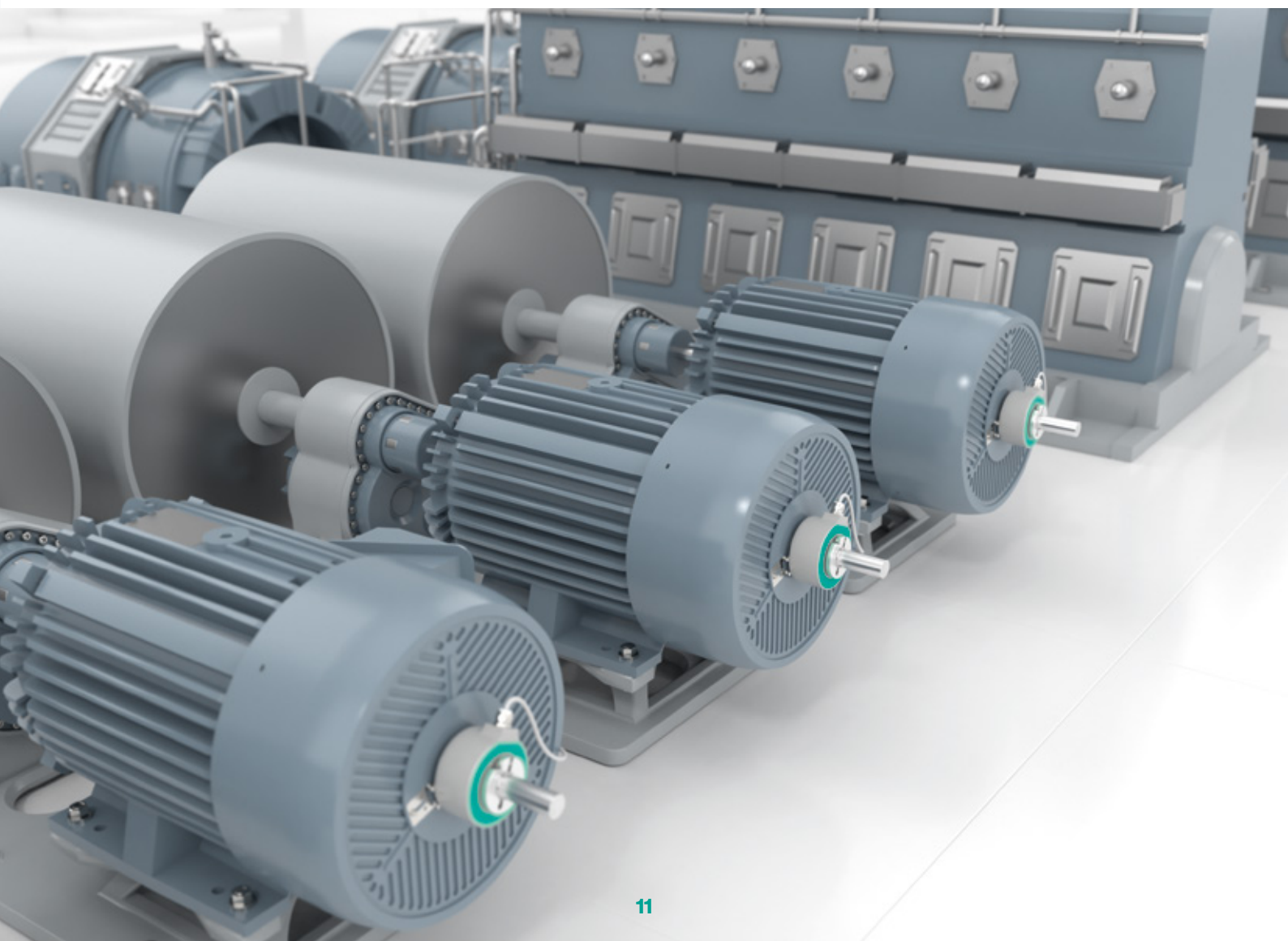
### Highlights

- Unmatched precision due to BlueBeam technology—whether in standard or heavy-duty applications
- Robust and compact: housing design focused on the essentials
- Particularly durable due to strong shock resistance, even at rotational speeds up to 6,000 rpm
- High mounting flexibility thanks to tapped holes in 60° steps and various accessories

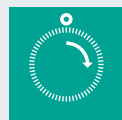


For more information, visit  
[pepperl-fuchs.com/pf-eni90](https://pepperl-fuchs.com/pf-eni90)

Technical Data	ENI90IL	ENI90PL	ENI90HD
<b>Max. rotational speed/ degree of protection</b>	3,000 rpm	6,000 rpm (IP65) 3,000 rpm (IP66 + IP67)	6,000 rpm (IP65) 3,000 rpm (IP66 + IP67)
<b>Resolution</b>	2,048 pulses	5,000 pulses	5,000 pulses
<b>Absolute accuracy</b>	$\leq \pm 0.025^\circ$	$\leq \pm 0.025^\circ$	$\leq \pm 0.025^\circ$
<b>Ambient temperature</b>	-20 °C ... 70 °C	-40 °C ... 85 °C	-40 °C ... 85 °C
<b>Degree of protection</b>	IP65	IP65 or IP66 + IP67	IP65 or IP66 + IP67
<b>Shock/vibration resistance</b>	100 g/10 g	300 g/30 g	200 g/20 g
<b>Shaft load (axial/radial)</b>	50 N/100 N	50 N/100 N	100 N/300 N
<b>Electrical interface</b>	Universal current driver or RS-422	Universal current driver or RS-422	Universal current driver or RS-422
<b>Connection method</b>	Cable, radial: 1 m or 5 m	Cable, radial: 1 m, 2 m, 3 m, 5 m, 10 m Radial plug: M23 cw, M23 ccw, M12 5-pin, M12 8-pin, MIL 7-pin, MIL 10-pin	Cable, radial: 1 m, 2 m, 3 m, 5 m, 10 m Radial plug: M23 cw, M23 ccw, M12 5-pin, M12 8-pin, cable duct
<b>Shaft</b>	25 mm, 38 mm, 5/8", 1"	20 mm, 25 mm, 30 mm, 38 mm, 1/2", 5/8", 3/4", 7/8", 1" Insulated shaft up to 2 kV for 20 mm, 25 mm, 30 mm	12 mm, 16 mm, 17 mm Insulated shaft up to 2.5 kV for 12 mm, 16 mm, 17 mm
<b>Order code</b>	ENI90IL	ENI90PL	ENI90HD



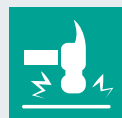
# Broad Range with Maximum Precision



Incremental



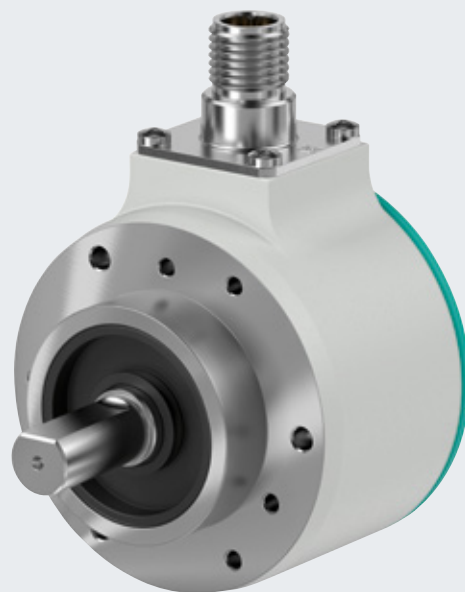
Ball bearing



Shock-/vibration-resistant



Degree of protection



## Impressive Feature Profile

When the highest signal quality and maximum precision are required, the ENI58PU and ENI58IL incremental rotary encoders are the products of choice. The BlueBeam technology used in combination with a precisely adjusted code disk enables maximum values in terms of signal quality and precision. The broad portfolio makes these advantages available in almost every application: the wide range of shaft, flange, and connection options—including for worldwide use—means you always get the right configuration. The especially rugged design ensures system availability and maximum process reliability at all times.

## Highlights

- BlueBeam technology: unmatched precision even at rotational speeds up to 12,000 rpm
- Maximum economic efficiency: Series ENI58PU for optimal price-performance ratio in standard applications
- A complete portfolio of shaft, flange, and connection options offers the optimal solution for a wide range of applications
- Heavy-duty design with interlocked bearings withstands high bearing loads and ensures long service life
- High shock and vibration resistance paired with EMC circuit protection for maximum system and process reliability

## Technical Data

	ENI58PU	ENI58IL
<b>Housing design</b>	Ø 58 mm	
<b>Mechanical versions</b>	Solid shaft: servo and square flange; recessed hollow and hollow shaft	
<b>Max. rotational speed</b>	6.000 U/min	12,000 rpm
<b>Degree of protection</b>	IP54	IP65, IP67
<b>Shock/vibration resistance</b>	100 g/10 g	300 g/30 g
<b>Connection method</b>	Cable	Cable, M12 plug, M23 plug, MIL7 plug, MIL10 plug
<b>Connection output</b>	Radial	Axial and radial
<b>Electrical interface</b>	Push-pull or RS-422, universal current driver (output level dependent on input voltage)	
<b>Resolution</b>	360, 1024, or 2048 pulses	Up to 5,000 pulses, higher on request
<b>Order code</b>	ENI58PU-S, ENI58PU-S**Q, ENI58PU-R, ENI58PU-H	ENI58IL-S, ENI58IL-S**Q, ENI58IL-R, ENI58IL-H

For more information, visit [pepperl-fuchs.com/pf-eni58](https://www.pepperl-fuchs.com/pf-eni58)



# Individually Programmable, Maximum Flexibility



Incremental



Ball bearing



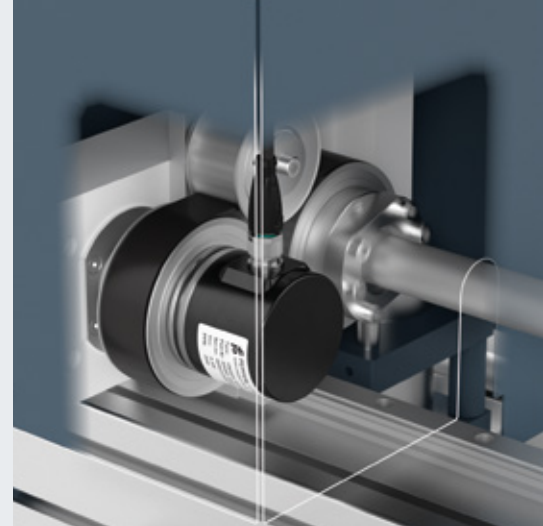
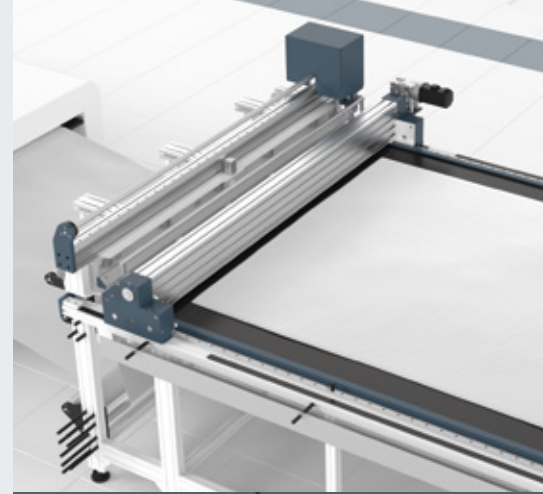
Shock-/vibration-resistant



Programmable via IO-Link



Degree of protection



## Optimal Application Solution

Maximum efficiency for a wide range of applications—this is exactly what the ENI58PL series incremental rotary encoder offers. It can be individually programmed via IO-Link and enables rapid commissioning of machines and systems. With a resolution of up to 16,384 pulses per revolution, the ENI58PL reliably delivers high-precision measurement signals even under difficult operational conditions. The various shaft, flange, and connection options are impressive in a wide range of applications.

## Highlights

- Flexible, configurable rotary encoder enables standardized machine design
- Increased cost efficiency with reduced stock and spare parts requirements
- Effortless configuration via standardized interface
- Variety of shaft, flange, output, and configuration options to suit all applications
- High resolution for increased machine availability and reliability
- Long-lasting, noncontact, and wear-free magnetic technology

## Technical Data

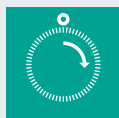
## ENI58PL

<b>Housing design</b>	Ø 58 mm
<b>Mechanical versions</b>	Push-in and solid shaft
<b>Max. rotational speed</b>	12,000 rpm
<b>Degree of protection</b>	IP65, IP67
<b>Shock/vibration resistance</b>	100 g/10 g
<b>Connection method</b>	Cable, M12 or M23
<b>Connection output</b>	Axial and radial
<b>Electrical interface</b>	Output type HTL/TTL programmable
<b>Resolution</b>	Up to 16,384 pulses
<b>Order code</b>	ENI58PL

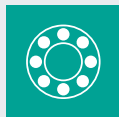


For more information, visit  
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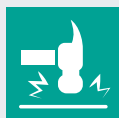
# Maximum Flexibility with Minimum Space Requirements



Incremental



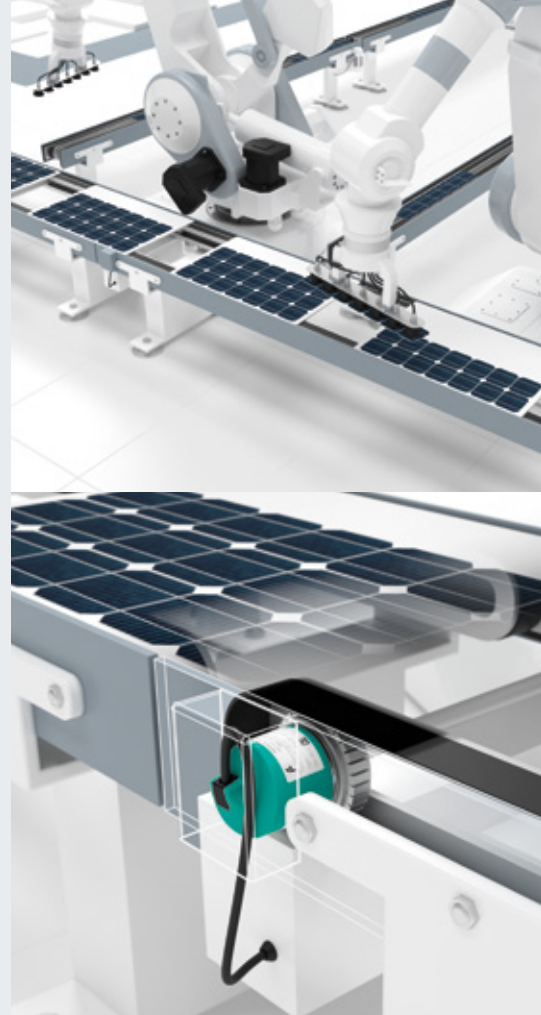
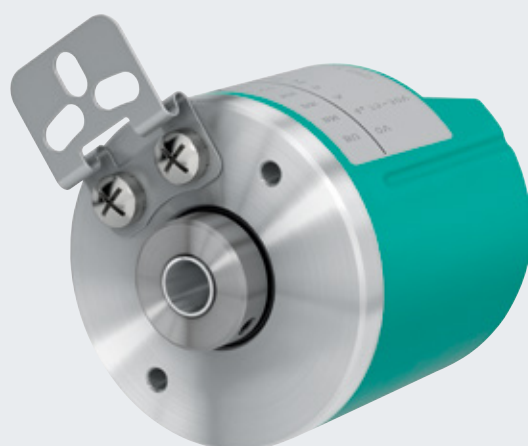
Ball bearing



Shock-/vibration-resistant



Degree of protection



## Performance in a Compact Format

This incremental rotary encoder impresses above all with its compact dimensions and highly flexible cable routing. With a diameter of just 40 mm, it is ideal for shaft positioning in elevators, for example. The rotary encoder is available in different shaft versions and is therefore suitable for a wide range of applications. Thanks to its RS-422 functionality with 5 V operation, electrical integration is also extremely simple.

## Highlights

- Compact design for use in confined spaces
- Flexible cable routing and mounting with tangential cable outlet
- Flexible electrical integration through utilization of RS-422 functionality
- Complete solution for elevator construction

## Technical Data

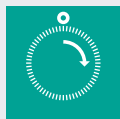
## TxI40

<b>Housing design</b>	Ø 40 mm
<b>Mechanical versions</b>	Solid, recessed hollow, and hollow shaft
<b>Shaft dimension</b>	Ø 6 mm to Ø 8 mm and imperial versions
<b>Flange type</b>	Clamping flange and hollow shaft flange with torque rest
<b>Max. rotational speed</b>	6,000 rpm
<b>Degree of protection</b>	IP54
<b>Max. shaft load</b>	Axial: 20 N, radial: 30 N
<b>Connection method</b>	Cable
<b>Connection output</b>	Tangential and radial
<b>Electrical interface</b>	Push-pull or RS-422, depending on the supply voltage
<b>Resolution</b>	Up to 1,024 pulses
<b>Order code</b>	TVI40, TSI40, THI40

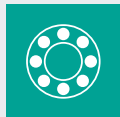
For more information, visit  
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## Certified for Worldwide Use



Incremental



Ball bearing



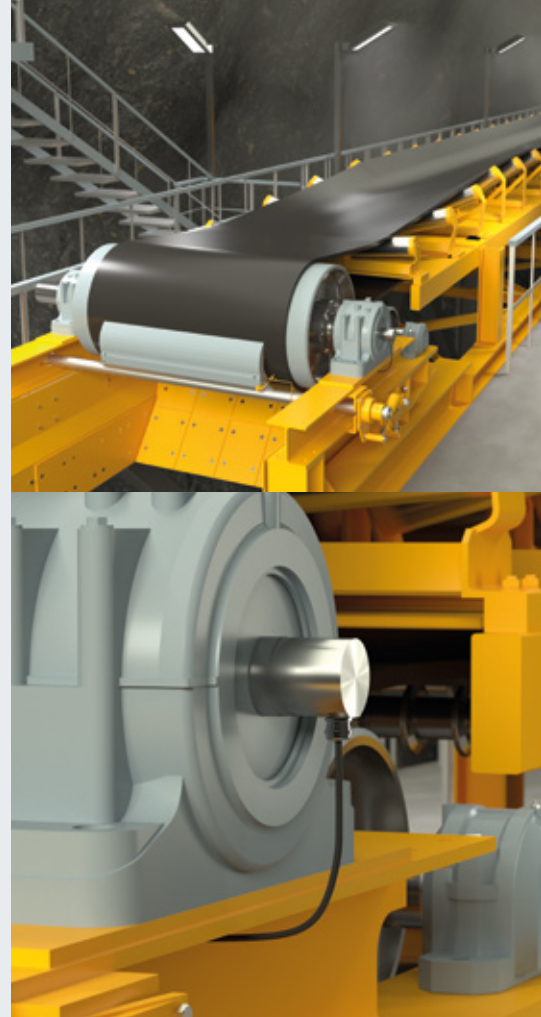
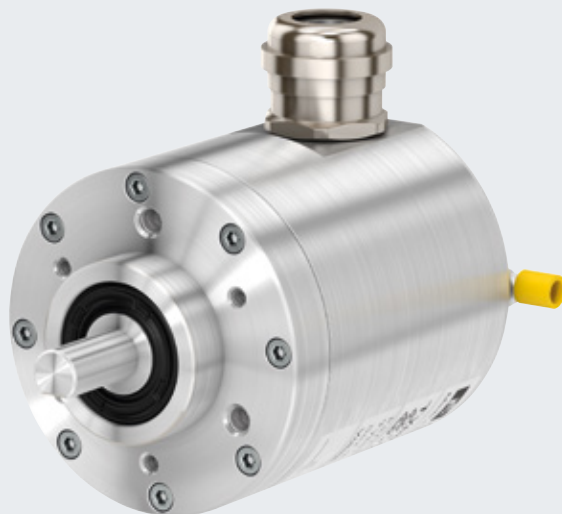
Shock-/vibration-resistant



Use in hazardous areas



Degree of protection



### Suitable for Any Climate

The Ex rotary encoder with ATEX, IECEx, Ex-NEPSI, and KOSHA certification for Zones 1 and 21 not only offers high protection. With its seawater-resistant housing, it is also suitable for use in offshore areas. The high rotational speed of 6,000 rpm with an extended temperature range of  $-40\text{ }^{\circ}\text{C}$  to  $70\text{ }^{\circ}\text{C}$  enables reliable use even under extreme climatic conditions. The compact housing design ensures efficient use of space. The rotary encoder is certified for use in explosion-hazardous areas (Group II) and mines susceptible to firedamp (Group I).

### Highlights

- Certification for worldwide use
- Robust ball-bearing design ensures a long service life
- Compact design, ideal for confined spaces
- Suitable for use in challenging environments with a high degree of protection and seawater-resistant housing
- Large range of applications due to extended temperature range of  $-40\text{ }^{\circ}\text{C}$  to  $70\text{ }^{\circ}\text{C}$  and high rotational speeds
- Wide range of variants for easy adaptation to any application

### Technical Data

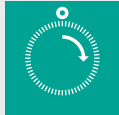
### RV170E

<b>Housing design</b>	$\varnothing$ 70 mm
<b>Mechanical version</b>	Solid shaft
<b>Shaft dimension</b>	$\varnothing$ 10 mm to $\varnothing$ 12 mm
<b>Flange type</b>	Clamping, servo, and Euro flange
<b>Max. rotational speed</b>	6,000 rpm
<b>Degree of protection</b>	IP66 and IP67
<b>Max. shaft load</b>	Axial: 110 N, radial: 150 N
<b>Connection method</b>	Cable
<b>Connection output</b>	Axial and radial
<b>Electrical interface</b>	Push-pull and RS-422
<b>Resolution</b>	Up to 5,000 pulses
<b>Certifications</b>	Ex II 2G Ex d IIC T6–T4 Gb Ex II 2D Ex t IIC T80 $^{\circ}\text{C}$ Db IP6X Ex-NEPSI, KOSHA
<b>Order code</b>	RV170E

For more information, visit  
[pepperl-fuchs.com/pf-rvi70e](https://www.pepperl-fuchs.com/pf-rvi70e)



# Reliable Sensor Technology for Wear-Free Continuous Operation



Incremental



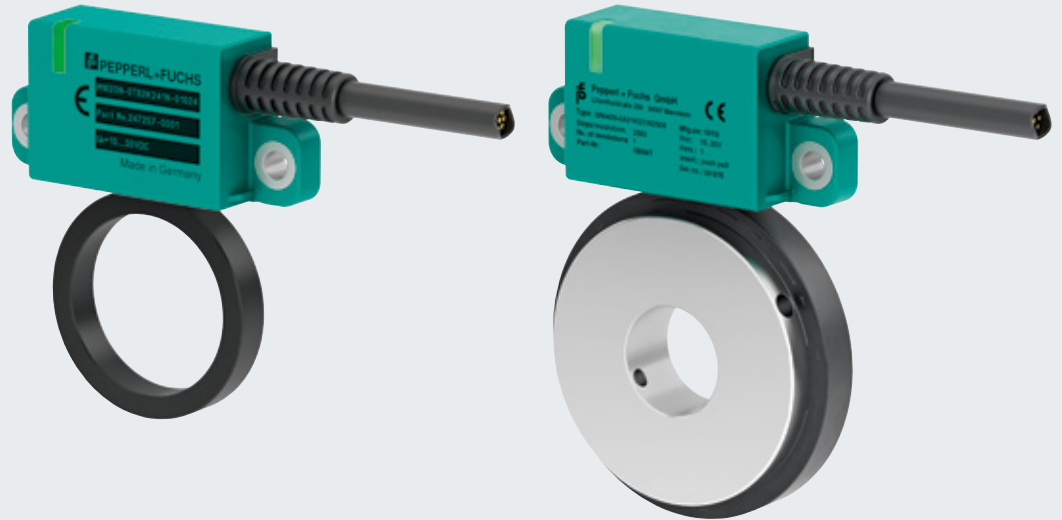
Bearing-free



Shock-/vibration-resistant



Degree of protection



## Noncontact and Wear-Free

Robust technology, easy installation, and reliable continuous functioning—these are the main features of the special technology of the bearing-free incremental rotary encoder. The MNI series bearing-free rotary encoder is available with a magnetic ring or magnetic wheel. Noncontact scanning ensures a long service life even at high rotational speeds of up to 30,000 rpm. In addition, significantly larger hollow shaft diameters can be accommodated than with conventional rotary encoder solutions.

## Minimal Installation Work

The bearing-free rotary encoder is characterized by simple mounting, which significantly reduces the installation effort. Intelligent assistance functions also support quick and easy commissioning. All key system information can be read via a two-color LED status indicator.



For more information, visit  
[pepperl-fuchs.com/pf-mni](https://pepperl-fuchs.com/pf-mni)

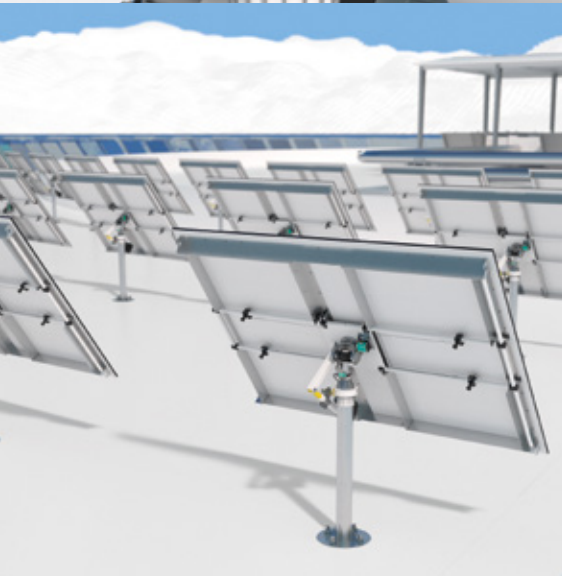
## Highlights

- Assistance functions and LED indicator for simplified installation and testing
- Quality assurance provided by full self-diagnosis, including for the magnetic wheel
- Resistant to dirt, thermal and mechanical shocks, and high-pressure cleaners
- Efficient solution with long service life at high rotational speeds and temperatures
- Version with magnetic ring allows the cable to be guided through the hollow shaft
- Reliable functionality even with large shaft play or large bearing gap
- Also suitable for heavy-duty applications

## Technical Data

## MNI

<b>Shaft type</b>	Hollow shaft
<b>Shaft dimension</b>	Up to Ø 30 mm, larger diameters on request
<b>Max. rotational speed</b>	30,000 rpm
<b>Degree of protection</b>	IP67, IP68, and IP69K
<b>Connection method</b>	Cable
<b>Connection output</b>	Radial
<b>Electrical interface</b>	Push-pull and RS-422
<b>Max. resolution</b>	7,200 pulses
<b>Order code</b>	MNI20, MNI40





For more information, visit  
[pepperl-fuchs.com/pf-abs-encoder](https://www.pepperl-fuchs.com/pf-abs-encoder)

## Absolute Rotary Encoders

# Precise Information for Complex Control Tasks

**Absolute rotary encoders are ideal wherever precise and sensitive control of motion sequences is required. Absolute rotary encoders from Pepperl+Fuchs are the precise sensors at the point of action. They not only offer a resolution up to the high-end range, but also provide reliable information even under demanding operating conditions. Absolute rotary encoders are available with both magnetic and photoelectric scanning. This makes them suitable for a wide range of applications.**

### **Magnetic, Robust, and Fail-Safe**

The magnetic technology from Pepperl+Fuchs sets new standards in the field of standard rotary encoders for industry. It is based on a proven design principle and achieves an accuracy of up to 0.1°. By using a Wiegand sensor instead of the previous gearbox for multiturn imaging, these rotary encoders are not only significantly more compact, but also more reliable than ever before. The design is absolutely wear-free and therefore guarantees a long service life.

The rotary encoders with this technology are not only designed to withstand shock and vibration, they are also resistant to dust and dirt and can even withstand extreme temperatures between -40 °C and 85 °C.

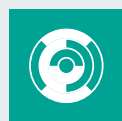
### **Optically Perfect and Absolutely Precise**

The optical absolute rotary encoders from Pepperl+Fuchs represent the top end of their class. They achieve very high accuracies of up to 0.01°, making them the perfect choice for all applications that require high dynamics and accuracy. Typical areas of use include modern CNC processing machines and numerous other applications in which maximum precision is the measure of all things.

### **Typical Areas of Application**

- Mechanical and plant engineering
- Warehousing and material handling
- Doors, gates, and elevators
- Medical technology
- Mobile equipment
- Print and paper industry
- Packaging industry
- Automotive industry
- Renewable energy

## Precision Guaranteed



Absolute



Ball bearing



Shock-/vibration-resistant



IO-Link



Degree of protection  
IP69K



### Accuracy for Precise Applications

With a total resolution of up to 32 bits and an accuracy of up to 0.1°, the ENA36 absolute rotary encoder is the ideal solution for dynamic applications in which precise positioning is essential. Its consistently robust technology makes it completely insensitive to shocks and vibrations. An ideal sensor in robotics, for example, but also in drive technology for rotation speed monitoring.

### Customization via IO-Link Communication

Hardly any two machines are the same, so the sensors have to fulfill very specific requirements to ensure reliable monitoring. The ENA36TL, the IO-Link version of the ENA36 absolute rotary encoder, offers individually adjustable parameters that can be modified via IO-Link communication. The various readings and output data that can be recorded in this way enable a well-founded analysis of the current machine status at any time. This ensures predictive maintenance and allows the system operator to initiate customized measures in a timely manner.

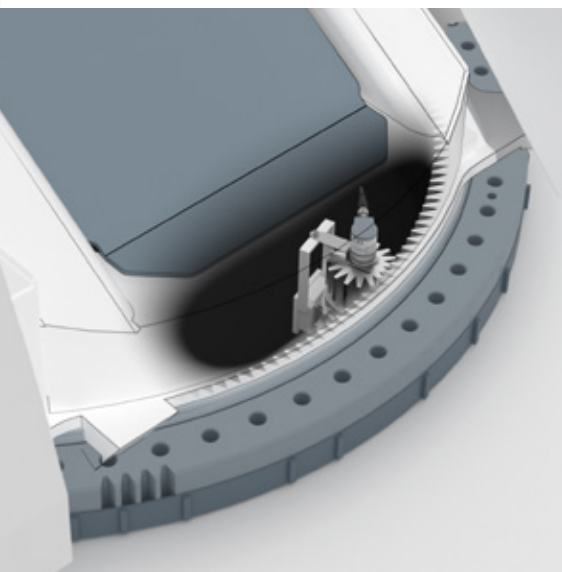
### Highlights

- Very high resolution and absolute accuracy of < 0.1° for high-precision applications
- Compact housing design for confined spaces
- Noncontact technology facilitates a long service life and reduces maintenance demands
- IO-Link version enables predictive maintenance



For more information, visit  
[pepperl-fuchs.com/pf-ena36](https://www.pepperl-fuchs.com/pf-ena36)

Technical Data	ENA36TL	ENA36IL	ENA36HD
<b>Housing design</b>	Ø 36 mm	Ø 36 mm	Ø 36 mm
<b>Mechanical version</b>	Solid shaft	Solid and recessed hollow shaft	Solid shaft
<b>Shaft dimension</b>	Ø 6 mm, 10 mm	Ø 6 mm, 10 mm	Ø 10 mm
<b>Flange type</b>	Servo flange and hollow shaft flange with torque rest	Servo flange and hollow shaft flange with torque rest	Servo flange with torque rest
<b>Max. rotational speed</b>	12,000 rpm	12,000 rpm	6,000 rpm
<b>Degree of protection</b>	IP65	IP54, IP64, and IP65	IP66, IP68, and IP69K
<b>Max. shaft load</b>	Hollow shaft: Axial: 19 N, radial: 44 N Recessed hollow shaft: Axial: 40 N, radial: 110 N	Axial: 20 N, radial: 40 N	Axial: 270 N, radial: 270 N
<b>Connection method</b>	Connector plug	Connector plug and cable	Connector plug
<b>Connection output</b>	Axial and radial	Axial and radial	Radial
<b>Electrical interface</b>	IO-Link	IO-Link, CANopen, J1939, SSI, analog	CANopen, J1939, SSI
<b>Max. resolution</b>	Singleturn: 65,536 (16 bit) Multiturn: 32,768 (15 bit)	Singleturn: 65,536 (16 bit) Multiturn: 65,536 (16 bit)	Singleturn: 65,536 (16 bit) Multiturn: 65,536 (16 bit)
<b>Order code</b>	ENA36TL	ENA36IL	ENA36HD



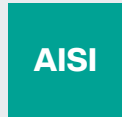
# Precision Even under the Harsh Conditions



Absolute



Ball bearing



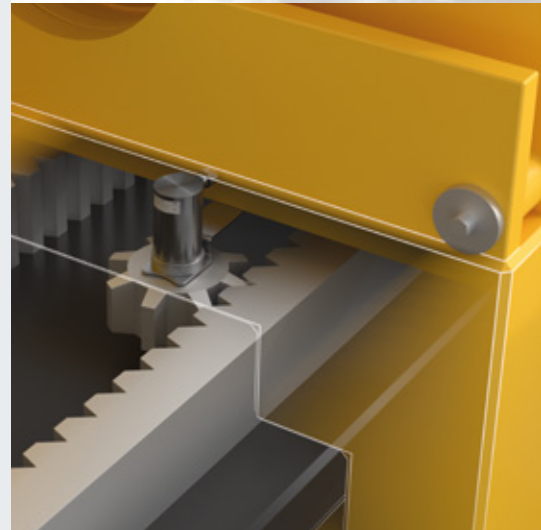
Stainless steel housing



Shock-/vibration-resistant



Degree of protection



## Tough Conditions, Exact Rotational Speed

Harsh conditions pose no problem for the extremely rugged ENA42HD absolute rotary encoder. It records the speed precisely even under the toughest conditions—shock and vibrations, high bearing loads, dirt, and temperature fluctuations do not affect it. On cranes, excavators, and lifting systems, the compact rotary encoder with its wear-free magnetic technology boasts complete reliability and a long service life.

## Highlights

- Use in challenging environments due to a high degree of protection and rugged stainless steel housing
- Magnetic scanning and Wiegand sensor for highly dynamic processes
- Wear-free technology allows a long service life and reduces maintenance demands
- Compact housing design for confined spaces

## Technical Data

## ENA42HD

<b>Housing design</b>	Ø 42 mm
<b>Mechanical version</b>	Solid shaft
<b>Shaft dimension</b>	Ø 10 mm
<b>Flange type</b>	Servo flange with torque rest
<b>Max. rotational speed</b>	6,000 rpm
<b>Degree of protection</b>	IP68 and IP69K
<b>Max. shaft load</b>	Axial: 180 N, radial: 180 N
<b>Connection method</b>	Connector plug and cable
<b>Connection output</b>	Axial and radial
<b>Electrical interface</b>	CANopen, J1939, SSI, IO-Link, analog
<b>Resolution</b>	Singleturn: 65,536 (16 bit), multturn: 32,768 (15 bit)
<b>Order code</b>	ENA42HD

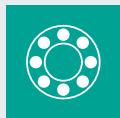


For more information, visit  
[pepperl-fuchs.com/pf-ena42hd](https://www.pepperl-fuchs.com/pf-ena42hd)

# All-Round Solution for a Wide Range of Applications



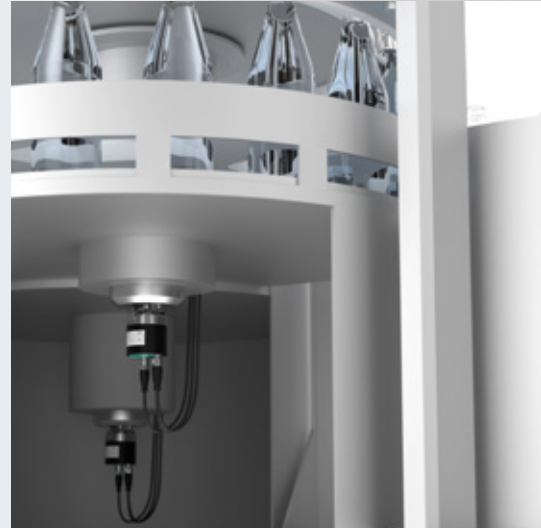
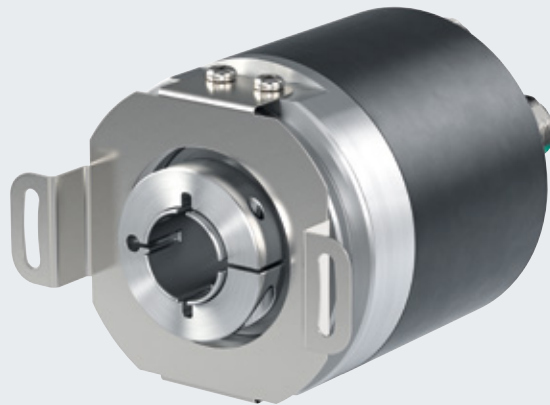
Absolute



Ball bearing



Degree of protection  
IP67



## Robust Performance to Industry Standards

With a diameter of 58 mm, the magnetic rotary encoder is ideal for use in numerous industrial applications. It is available with both a solid and a recessed hollow shaft and therefore ensures optimal adaptation to numerous applications. With its high total resolution of up to 32 bits and high resistance to shock and vibration, it also sets a new bar for the industry standard.

## Highlights

- Magnetic scanning and Wiegand sensor for highly dynamic processes
- Optical sampling with absolute accuracy of <math><0.1^\circ</math> for high-precision applications
- Compact design in all standard interfaces for flexible use
- Noncontact technology allows a long service life and reduces maintenance demands
- Corrosion-resistant, seawater-proof design opens up a wide range of applications, even under extreme conditions

## Technical Data

### ENA58IL

### ENA58PL

Technical Data	ENA58IL	ENA58PL
<b>Housing design</b>	Ø 58 mm	
<b>Mechanical version</b>	Solid and recessed hollow shaft	
<b>Shaft dimension</b>	Solid shaft: Ø 6 mm to Ø 10 mm Recessed hollow shaft: Ø 6 mm to Ø 15 mm	
<b>Flange type</b>	Servo flange and hollow shaft flange with torque rest	
<b>Max. rotational speed</b>	12,000 rpm	
<b>Degree of protection</b>	IP65 and IP67	
<b>Max. shaft load</b>	Axial: 40 N, radial: 110 N	
<b>Connection method</b>	Connector plug and cable	
<b>Connection output</b>	Axial and radial	
<b>Electrical interface</b>	PROFINET, EtherNet/IP, EtherCAT, IO-Link, SSI, CANopen, J1939	
<b>Resolution</b>	Singleturn: 65,536 (16 bit) Multiturn: 65,536 (16 bit)	
<b>Order code</b>	ENA58IL	ENA58PL

For more information, visit  
[pepperl-fuchs.com/pf-ena58](https://www.pepperl-fuchs.com/pf-ena58)



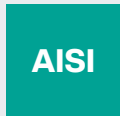
# Certified for Worldwide Use



Absolute



Ball bearing



AISI

Stainless steel housing



Use in hazardous areas



IP66

Degree of protection



### Protected Processes in Hazardous Areas

The variety of applications in hazardous areas is almost unlimited. Various requirements with regard to type of protection, field of industry, or country-specific guidelines must be observed—regardless of whether this involves oil and gas extraction, chemical processes, or other industrial systems in which flammable gas mixtures can occur.

### Flexible Mounting and Cabling

The DVS78E rotary encoder is suitable for rotational speeds of up to 3,000 rpm and is designed for a temperature range of  $-40\text{ °C}$  to  $70\text{ °C}$ . It complies with type of protection Ex d and meets the international ATEX, IECEx, and Ex-NEPSI requirements for gases according to Zones 1 and 2, and for dusts according to Zones 21 and 22. The modular design with removable connection cover facilitates installation and servicing. With the fieldbus versions, bus coding can be freely programmed directly on-site. The rotary encoder is certified for use in Ex Zones (Group II) and mines susceptible to firedamp (Group I).



For more information, visit  
[pepperl-fuchs.com/pf-dvs78e](https://www.pepperl-fuchs.com/pf-dvs78e)

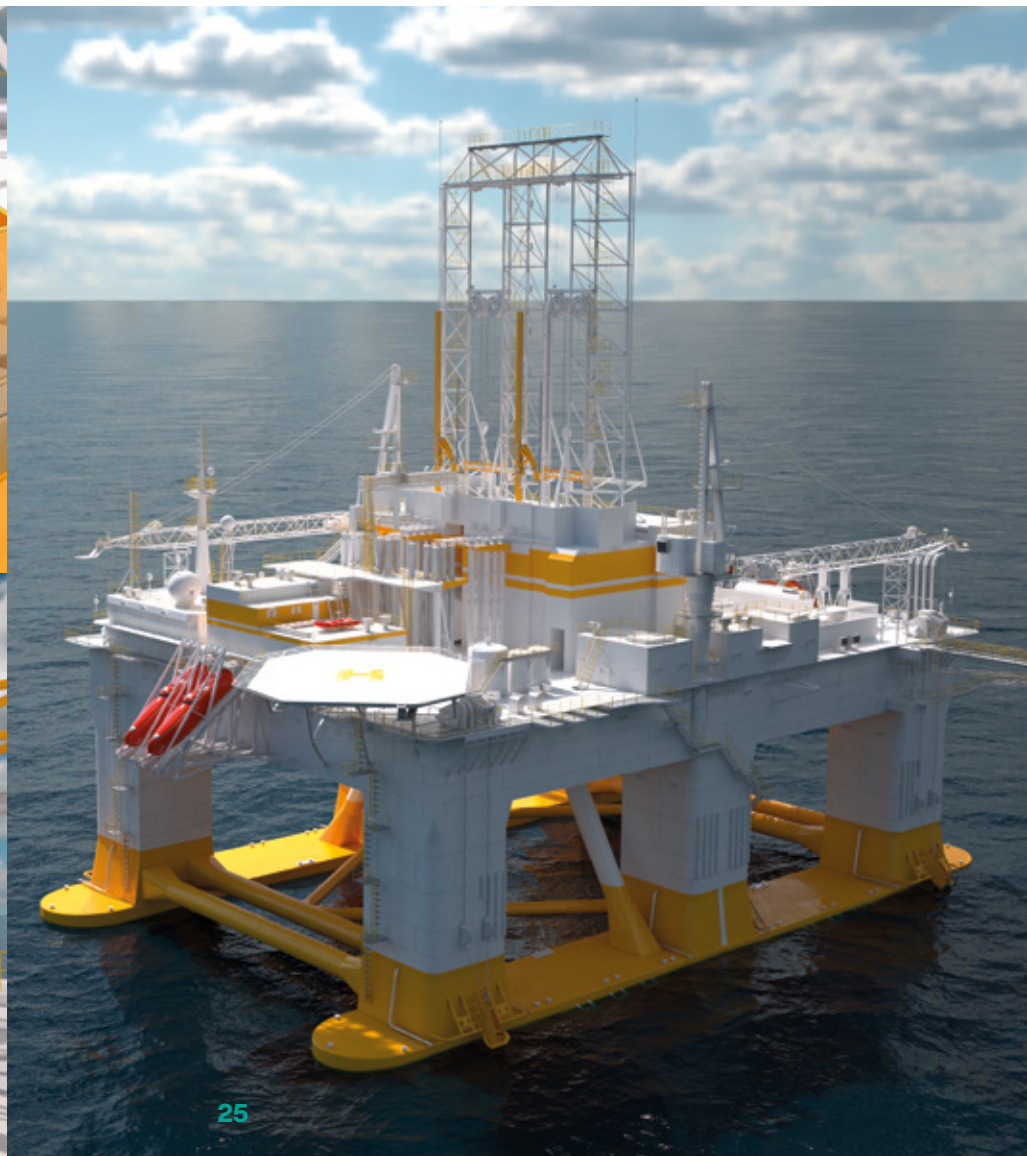
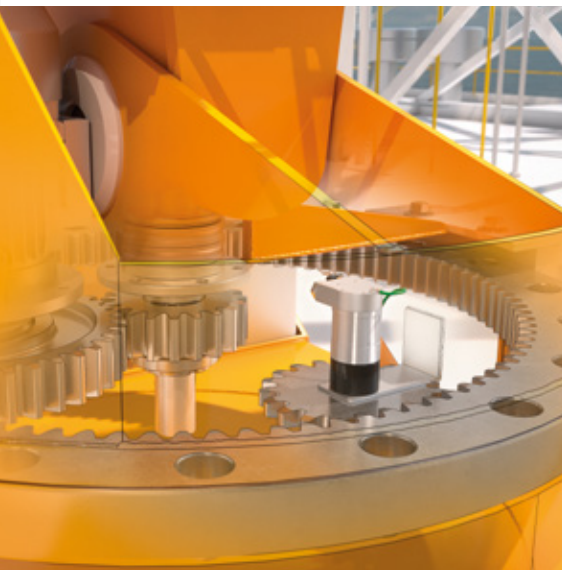
## Highlights

- Removable connection cover: flexible mounting and wiring on-site
- Simple maintenance: separation of the cable and rotary encoder means there is no need to replace the entire device
- ATEX, IECEx, and Ex NEPSI certification for worldwide use in Zone 1/21
- Wide range of variants for easy adaptation to any application
- Specially designed for offshore applications
- Robust design for use in extreme conditions

## Technical Data

## DVS78E

<b>Housing design</b>	Ø 78 mm
<b>Mechanical version</b>	Solid shaft
<b>Shaft dimension</b>	Ø 10 mm to Ø 12 mm
<b>Flange type</b>	Clamping flange and servo flange
<b>Max. rotational speed</b>	3,000 rpm
<b>Degree of protection</b>	IP66
<b>Max. shaft load</b>	Axial: 60 N, radial: 80 N
<b>Connection method</b>	Cable and cable gland with stopping plug
<b>Connection output</b>	Radial
<b>Electrical interface</b>	SSI, CANopen, PROFIBUS, DeviceNet
<b>Resolution</b>	Singleturn: 65,536 (16 bit) Multiturn: 16,384 (14 bit)
<b>Certifications</b>	Ex II 2G Ex db IIC T5 Gb Ex II 2D Ex tb IIC T100 °C Db IP6X Ex I M2 Ex db I/IIC T5 Ex-NEPSI
<b>Order code</b>	AVS78E, AVM78E, CVS78E, CVM78E, PVS78E, PVM78E, DVS78E, DVM78E





For more information, visit  
[pepperl-fuchs.com/pf-cable-pulls](https://pepperl-fuchs.com/pf-cable-pulls)

# Wide Range of Applications for Linear Distance Measurement

The selection of cable-pull rotary encoders from Pepperl+Fuchs is characterized by a modular product architecture. It offers a large variety of versions for virtually any application area. Optimally matched components guarantee a long service life and ensure reliable processes for linear distance measurement and positioning.

### Direct Measurement of Linear Movements

Cable-pull rotary encoders are ideal for detecting linear motion sequences. Inside a cable pull, a steel cable winds around a spring-loaded drum. This rotates the shaft of a rotary encoder when the cable is pulled in or out, which in turn converts linear motion into rotary motion.

### Modular Design for Every Application

The consistently modular design concept enables the perfect harmonization of cable pull, rotary encoder, and accessory components. It ranges from a compact design to an extremely rugged version and covers a wide range of applications. Distances of up to 60 meters can be measured. Standardized interfaces support easy integration into any system environment. A comprehensive range of accessories enables use even under the most adverse conditions.

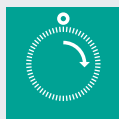
### Robust Characteristics Even Allow for Offshore Applications

Cable-pull rotary encoders have proven to be a practical solution in many industrial sectors. Driverless transport systems are a typical application. Here, they are integrated into the lifting unit to record position and speed. The same applies to mobile extension cranes, for example. Here, they monitor linear extension and retraction movements of booms in real time and therefore provide the electronic crane control system with precise information about the current position. Pepperl+Fuchs offers heavy-duty versions especially for outdoor use, which have even proven themselves in shipbuilding and offshore applications. They reliably monitor the movement processes of mobile machines, conveyor systems, cranes, and wind turbines, even in extreme weather conditions.

### Typical Areas of Application

- Warehousing and material handling
- Automotive industry
- Doors, gates, and elevators
- Mobile equipment
- Steel industry
- Offshore and shipbuilding
- Medical technology

# Accuracy in a Small Footprint



Incremental



Absolute



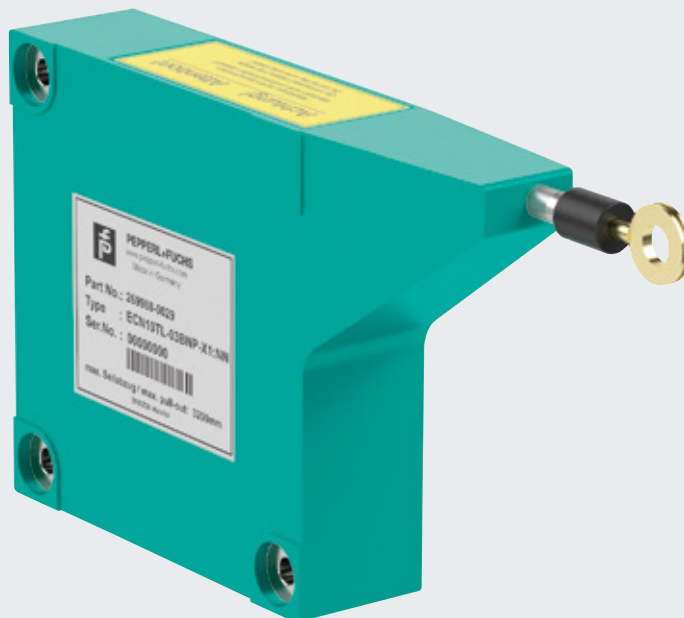
Linearity  $\pm 0.1\%$



Maximum extension



Degree of protection



## Space-Saving and Flexible

The compact dimensions of the ECN10TL cable pull make it ideal for applications where space is at a premium. The slimline housing is designed for three-sided installation, so it is much easier to integrate into existing systems.

In addition, this cable pull does not require a coupling and therefore offers precise information feedback for permanently reliable and exact positioning. A typical application is the precision adjustment of the height position of driverless transport systems or, for example, measurement of the fork position of forklifts.



For more information, visit  
[pepperl-fuchs.com/pf-ecn10tl](https://pepperl-fuchs.com/pf-ecn10tl)

## Highlights

- Very lightweight, compact design makes it easy to handle and allows installation in tight spaces
- Multiple mounting options reduce installation costs and increase flexibility
- Direct coupling ensures accurate information feedback and reliable process control

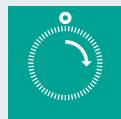
### Technical Data

### ECN10TL

<b>Measurement length</b>	3,000 ... 10,000 mm
<b>Design</b>	80 mm, 130 mm, 190 mm
<b>Repeat accuracy</b>	0.005 %
<b>Linearity</b>	±0.01 %
<b>Measuring cable diameter</b>	0.55 mm
<b>Degree of protection</b>	IP50
<b>Material</b>	Housing: plastic Measuring cable: stainless steel 1.4401/316
<b>Order code</b>	ECN10TL



# Robust Solution for Industrial Environments



Incremental



Absolute



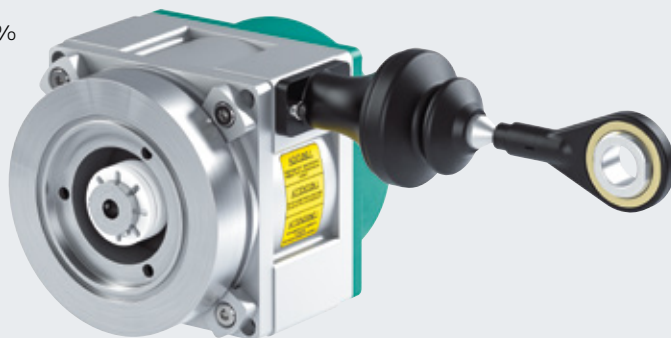
Linearity  $\pm 0.1\%$



Maximum extension  
5 m



Degree of protection



## Versatile Use

With a rugged aluminum housing, the ECN21IL series cable pull is extremely durable. The mechanical design ensures long-lasting, flawless operation even in demanding industrial environments. An optional attachment to protect the cable pull reduces maintenance and increases its service life. It provides reliable data for precise positioning. This cable pull is used, for example, in warehouse robots and automated storage and retrieval systems, but also for height adjustment of vertical lifters and scissor lift tables.

## Highlights

- Robust solution for reliable use in harsh industrial environments
- Compact design for flexible installation in tight spaces
- Optional anodized aluminum coating for use in adverse environments
- Cable outlet options protect the cable pull and reduce maintenance while increasing durability

## Technical Data

## ECN21IL

<b>Measurement length</b>	2,000 ... 5,000 mm
<b>Design</b>	80 mm, 130 mm
<b>Repeat accuracy</b>	0.1%
<b>Linearity</b>	$\pm 0.1\%$
<b>Measuring cable diameter</b>	0.55 mm
<b>Degree of protection</b>	IP64
<b>Material</b>	Housing: aluminum, anodized aluminum Measuring cable: stainless steel 1.4401/316
<b>Order code</b>	ECN21IL



For more information, visit  
[pepperl-fuchs.com/pf-ecn21il](https://pepperl-fuchs.com/pf-ecn21il)

# Especially Rugged in Extreme Environments



Incremental



Absolute



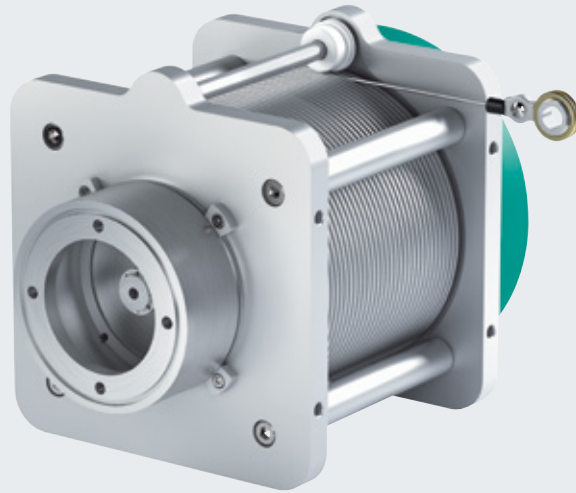
Linearity  $\pm 0.1\%$



Maximum extension  
20 m



Degree of protection  
IP65



## Consistently Reliable

Undaunted by salt spray, extreme weather conditions, and high temperature fluctuations, the ECN40HD series stands for durability without compromise. Due to the open design of the cable pull, deposits can be removed quickly and easily, which increases the service life. At the same time, the special cable suspension protects the measuring cable and increases flexibility. This cable pull ensures reliable operation of rolling and cutting machines, automatic feeders, and cranes. The uncompromising technology is just as much in demand in industrial production as it is on ships, in pipeline construction, and in offshore wind turbines.

## Highlights

- Especially robust solution for extremely harsh environmental conditions
- The open cable system allows easy cleaning and facilitates handling
- Grooved cable drum and guiding wheel for increased accuracy and long service life
- Ball joint as cable attachment increases the flexibility and durability of the measuring cable

## Technical Data

## ECN40HD

<b>Measurement length</b>	5,000 ... 20,000 mm
<b>Drum circumference</b>	500 mm
<b>Design</b>	190 mm
<b>Repeat accuracy</b>	0.1%
<b>Linearity</b>	$\pm 0.1\%$
<b>Measuring cable diameter</b>	2 mm
<b>Degree of protection</b>	IP65
<b>Material</b>	Housing: anodized aluminum Measuring cable: stainless steel 1.4401/316, plastic sheathing
<b>Order code</b>	ECN40HD



For more information, visit  
[pepperl-fuchs.com/pf-ecn40hd](https://pepperl-fuchs.com/pf-ecn40hd)

# High Level of Flexibility for Demanding Applications



Incremental



Absolute



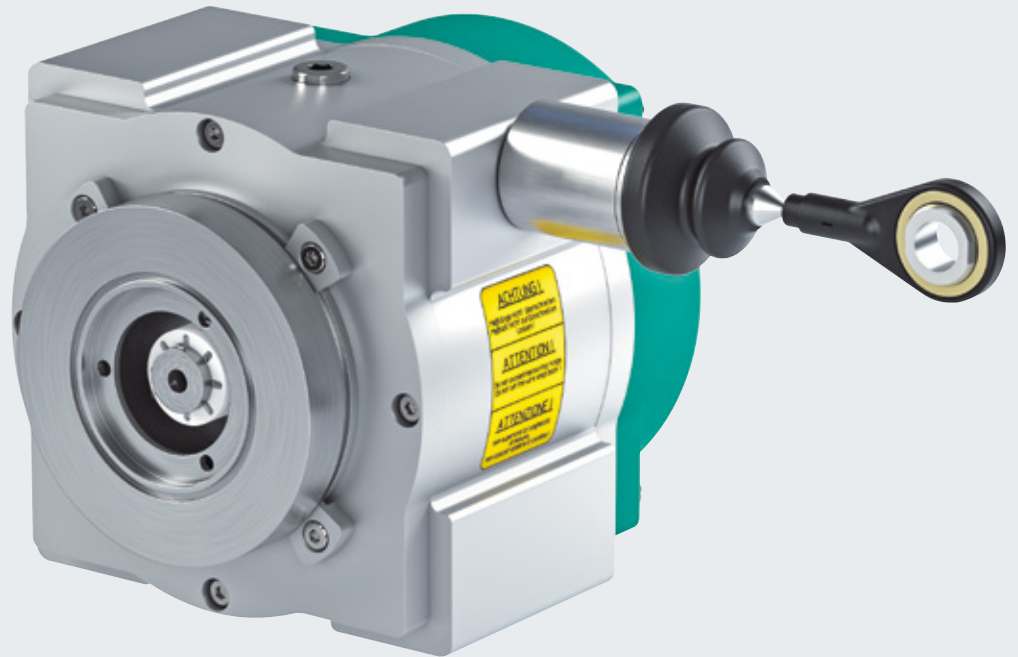
Linearity  $\pm 0.1\%$



Maximum extension



Degree of protection



## Process Reliability at the Forefront

The ECN30PL cable pull has been specially developed to deliver maximum reliability and consistently precise measurement results, even under harsh operating conditions. Among other things, the cable pull features axial drum movement with a threaded spindle, an optional anodized coating, and various cable pull attachments that guarantee optimal protection of the cable pull and therefore increase its service life.

A measuring length of up to 60 meters also allows precise detection even over long distances. This makes the series the first choice for applications such as monitoring load torques in mobile lifting and crane systems.



For more information, visit  
[pepperl-fuchs.com/pf-ecn30pl](https://pepperl-fuchs.com/pf-ecn30pl)

## Highlights

- Robust solution for reliable use in harsh industrial environments
- Axial drum movement via threaded spindle ensures consistent linearity
- Optional anodized aluminum coating for use in adverse environments
- Increased flexibility for cable entry/exit angles
- Various cable pull attachments and combinations provide increased flexibility and durability

## Technical Data

## ECN30PL

<b>Measurement length</b>	1,000 mm ... 60,000 mm
<b>Design</b>	80 mm, 130 mm, 190 mm
<b>Repeat accuracy</b>	0.1%
<b>Linearity</b>	±0.1%
<b>Measuring cable diameter</b>	1.35 mm
<b>Degree of protection</b>	IP64
<b>Material</b>	Housing: aluminum, anodized aluminum Measuring cable: stainless steel 1.4401/316
<b>Order code</b>	ECN30PL



# The Perfect Addition: Accessories and Other Components

Only perfectly coordinated connection and mounting technology ensures optimal integration of a rotary encoder. The comprehensive range of accessories from Pepperl+Fuchs supplies all the necessary components for a perfect ready-to-install solution.

## Measuring Wheels

Equipped for any surface with measuring wheels in different sizes, coatings, and running surface structures.

## Cable Pull Accessories

The comprehensive range of accessories for cable suspensions, cable pull attachments, and guide pulleys enables consistently reliable measurement results with an increased service life even under difficult ambient conditions.

## Electrical Connection

For optimal connection of the rotary encoder, you will be provided with the appropriate single-ended female cable socket, connector, and connection cable.

## Couplings

Couplings are used to transmit rotational movements between the motor and encoder shaft, and to compensate for axial, angular, and radial misalignments.



For more information, visit  
[pepperl-fuchs.com/pf-encoder-accessories](https://www.pepperl-fuchs.com/pf-encoder-accessories)

### Evaluation

Various counters are available for visualizing rotary encoder signals such as display, preselection, and totalizers.

### Mounting Accessories for Rotary Encoders with Hollow and Recessed Hollow Shaft

Torque spring plates and torque rests are available for connecting the rotary encoder and motor spindle.

### Mounting Accessories for Rotary Encoders with Solid Shaft

Shaft couplings, mounting and eccentric clamping elements, mounting brackets and domes, and adapter flanges ensure that the rotary encoder is adapted safely and stays firmly in place.

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