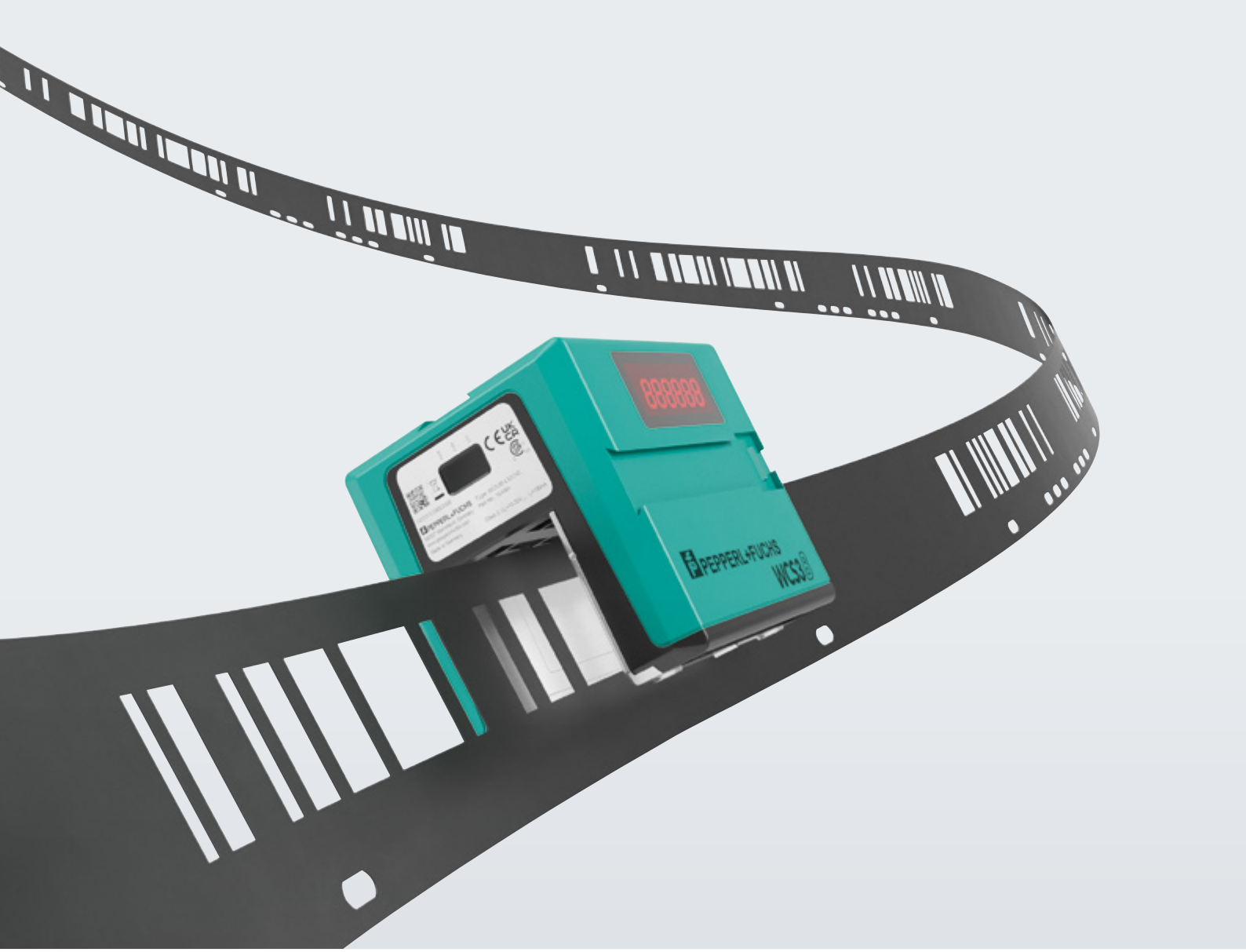
The Absolute Benchmark.

Proven system with maximum precision—even in extreme weather, dirt, and harsh environments.

WCS Absolute Positioning System



Your automation, our passion.

PEPPERL+FUCHS

WCS Position Encoding System

The Absolute Benchmark in Positioning

The automation of material handling plants often calls for millimeter-precise information about the position of the mobile unit. The proven WCS position encoding system from Pepperl+Fuchs delivers this precision with the highest possible level of reliability. Adverse conditions, such as extreme weather, dirt, and aggressive environments, have no effect on accuracy.

Modular Absolute Positioning

The WCS combines a metal or plastic code rail with photoelectric sensors for scanning and ensures precise positioning even in adverse conditions. Position values are detected on a noncontact and absolute basis. The modular design means that the system can be perfectly adapted to any application and ambient conditions.

WCS—Rugged Positioning Since 1989

The WCS was launched in 1989 as the world's first absolute positioning system. Since then, continuous efforts have been made to perfect its capabilities based on the experience gained at countless operating locations. Extensive know-how about applications and comprehensive support from Pepperl+Fuchs are an integral part of the system.

Highlights

- Reliable and precise absolute position detection with the sophisticated position encoding system
- Reliable position detection even on curved tracks, inclines, declines, lane changes, and gradients
- Flexible integration based on compatibility with all common control systems
- IP69 protective housing for use in extreme outdoor applications like those in shipping ports and at electroplating plants
- Simple setup and error indication: Translucent protective housing enables clearly visible LED status indicators and display






WCS Position Encoding System

Proven System for the Most Challenging Ambient Conditions

A rugged read head for absolute positioning, a U-shaped design to protect against the influence of external light, and infrared LEDs for use without contact and wear: These are the features that make the position encoding system impressive, even in extreme ambient conditions.

Incredible Precision, Even in Adverse Conditions

Thanks to a specially designed code rail and non-contact scanning by the read head, the WCS reliably detects a new position value every 0.8 mm—in real time and even at high speeds. High-performance emitter LEDs make the sensors especially resistant to contamination, smoke, fog, and dusty environments, ensuring that position data can be reliably detected and transferred to the control panel via standard interfaces. A wide range of interface modules are available for connection to various bus systems.

The WCS Outdoor and WCS Extended product variants are sophisticated solutions for especially demanding or very long travel paths. The two options can be combined with each other for use even in harsh environments, such as port facilities.

For more information, visit
pepperl-fuchs.com/pf-wcs

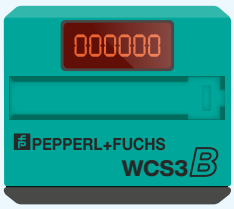
Excerpt of Technical Data	WCS3B-LS221	WCS2B-LS311H	WCS-LS410D	WCS3B-LS510-OM	WCS3B-LS610DH-OM	WCS3B-LS710S	WCS3B-LS810DS
Resolution	±0.40 mm (1,250 pos./m)						
Movement speed (v_{max})	12.5 m/s						
Measurement length	up to 314.5 m						
Interface	RS485	SSI	CANopen	EtherNet/IP	PROFINET	EtherCAT	IO-Link
Options	–	heater	display	outdoor	outdoor, heater, display	switching output for overspeed	outdoor, display, switching output for overspeed and position ranges

Read Head

Code Rail

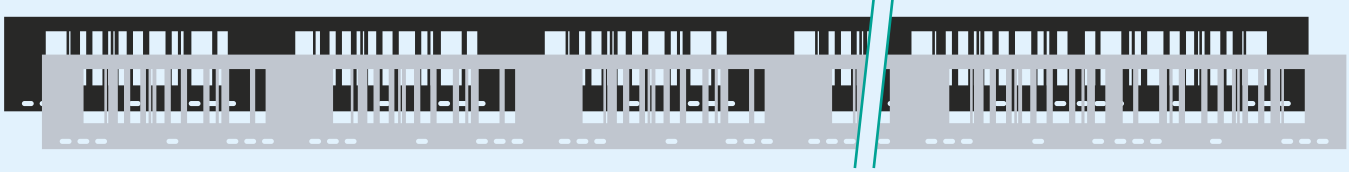
Mounting System

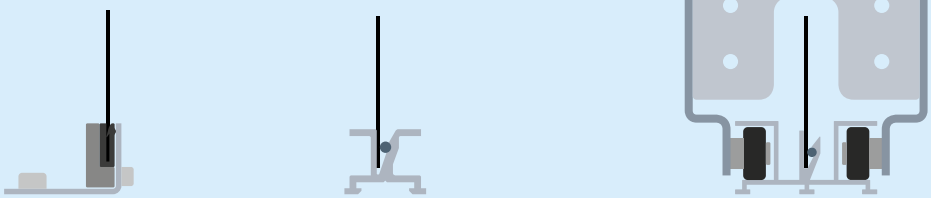
WCS System Components



ID pads

Plastic or stainless steel





From left to right:
code rail bracket, aluminum profile,
aluminum profile with guide trolley

WCS Position Encoding System

Robustness and Precision in all Conditions

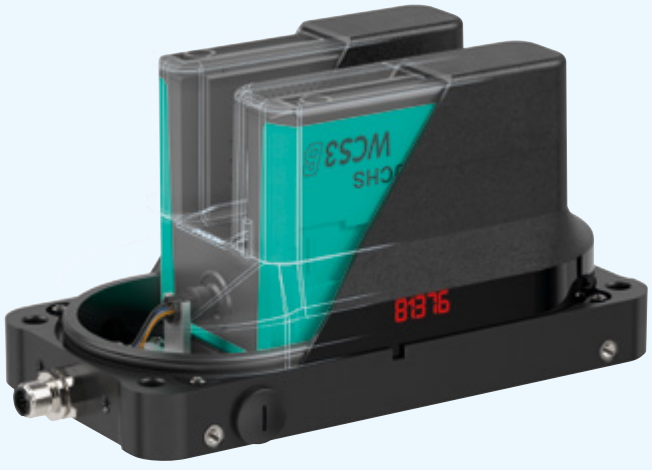
Each application places different demands on the sensor technology. The portfolio of U-shaped WCS read heads from Pepperl+Fuchs therefore consists of different versions that can be selected depending on the application requirement.

Outdoor: High Protection Class, High Resistance

The WCS with protective housing is designed to withstand extreme environments in which other positioning systems reach their performance limits. With its translucent housing and a protection class of up to IP69, it offers the highest possible level of impermeability to dust and moisture. This allows the WCS to withstand salt water, aggressive substances, and the jet of a high-pressure cleaner. A high level of impact resistance means that it remains unaffected by typical outdoor situations.

Display: Straightforward Commissioning, Detailed Diagnostics

The clearly visible display on the read head makes commissioning straightforward. It also provides access to diagnostic functions while directly displaying position values so that detailed analysis can be carried out on the spot. Dirty or damaged code rail segments can be identified immediately. The display facilitates quick system setup and fault repair and can be rotated by 180° to allow users to choose between suspended and standing installation.



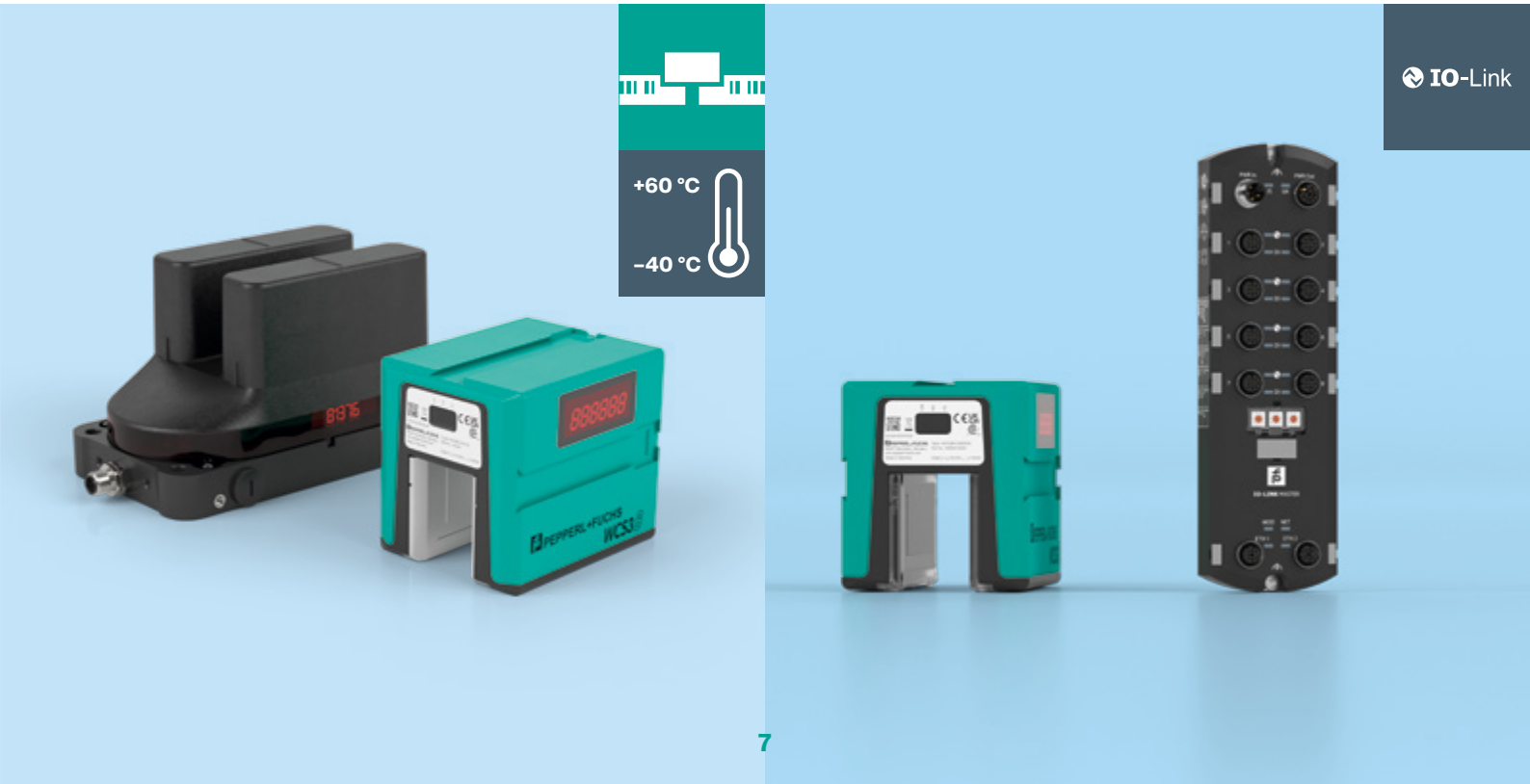
Variants: Functional Safety for Long Distances and Extreme Temperatures

The WCS Extended is useful when particularly long distances need to be covered. Two standard code rail segments can be easily combined with each other using a code rail extender. The result is precise positioning over 629 m without any additional programming.

An integrated heating element means that the read head can be used in temperatures as low as –40 °C. The position encoding system can be put into operation quickly in spite of ice and snow, and any adverse impacts from condensation are reliably avoided.

IO-Link: Precision in IIoT Applications

The WCS with IO-Link interface can be quickly, easily, and cost-effectively integrated into IIoT applications. In addition to precise absolute positioning, it provides additional, comprehensive data sets thanks to integrated sensor technology for acceleration and temperature measurement. This enables predictive maintenance and therefore contributes to optimal plant availability.



WCS Position Encoding System IO-Link

Efficient Solution for IIoT Applications

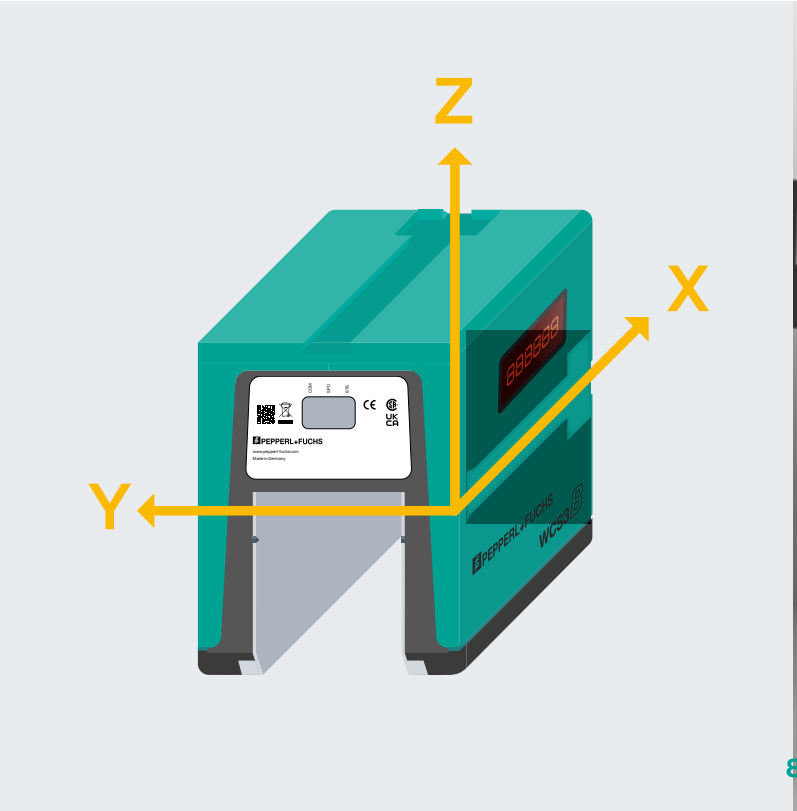
The WCS with IO-Link interface has impressively simple commissioning and data migration. Compatibility with a wide range of IO-Link devices provides a cost-effective system solution, especially in plants with existing IO-Link infrastructure. The universal fieldbus is connected via an IO-Link master, for example from the ICE2 series.

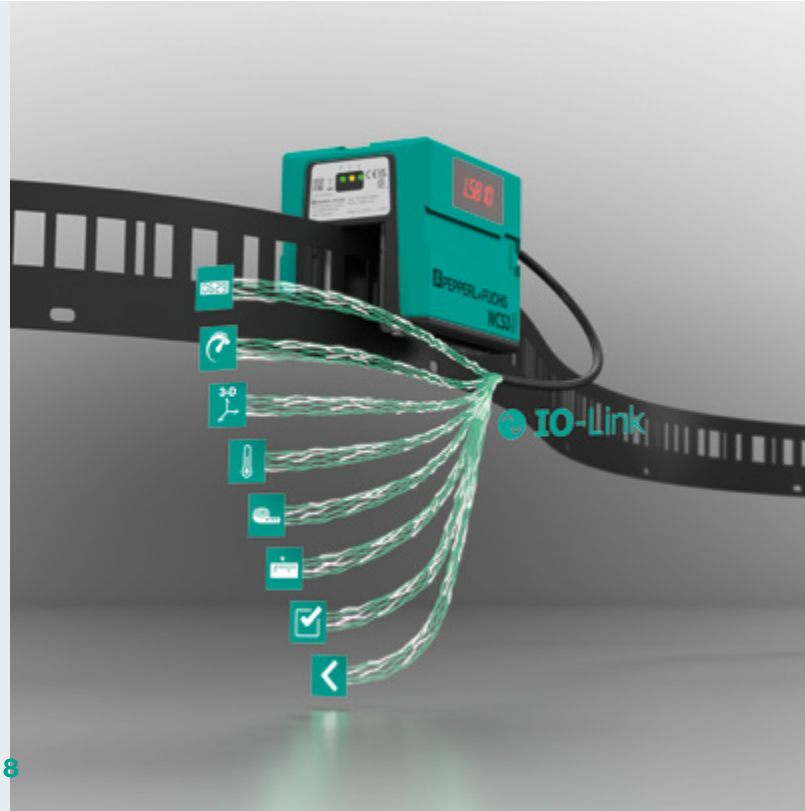
Comprehensive Data Sets for Predictive Maintenance

Additional sensor technology for acceleration measurement and temperature measurement is integrated in the read head of the absolute positioning system using IO-Link. In addition to data on position and speed, the sensor therefore provides further information for continuous system monitoring, such as temperature, acceleration values in three axes, and a direction bit. Moreover, the active operation of the read head is also displayed if a position is maintained for a long time.

Optimal Customization to Individual Applications

The WCS with IO-Link can be installed in an especially flexible way: The display rotates automatically so that the displayed value can be read easily in any mounting position. The device can also be combined with three options from the existing portfolio: The IO-Link interface is available for the standard version, the display option, and the version with outdoor housing and heating, which is specially designed for outdoor use.



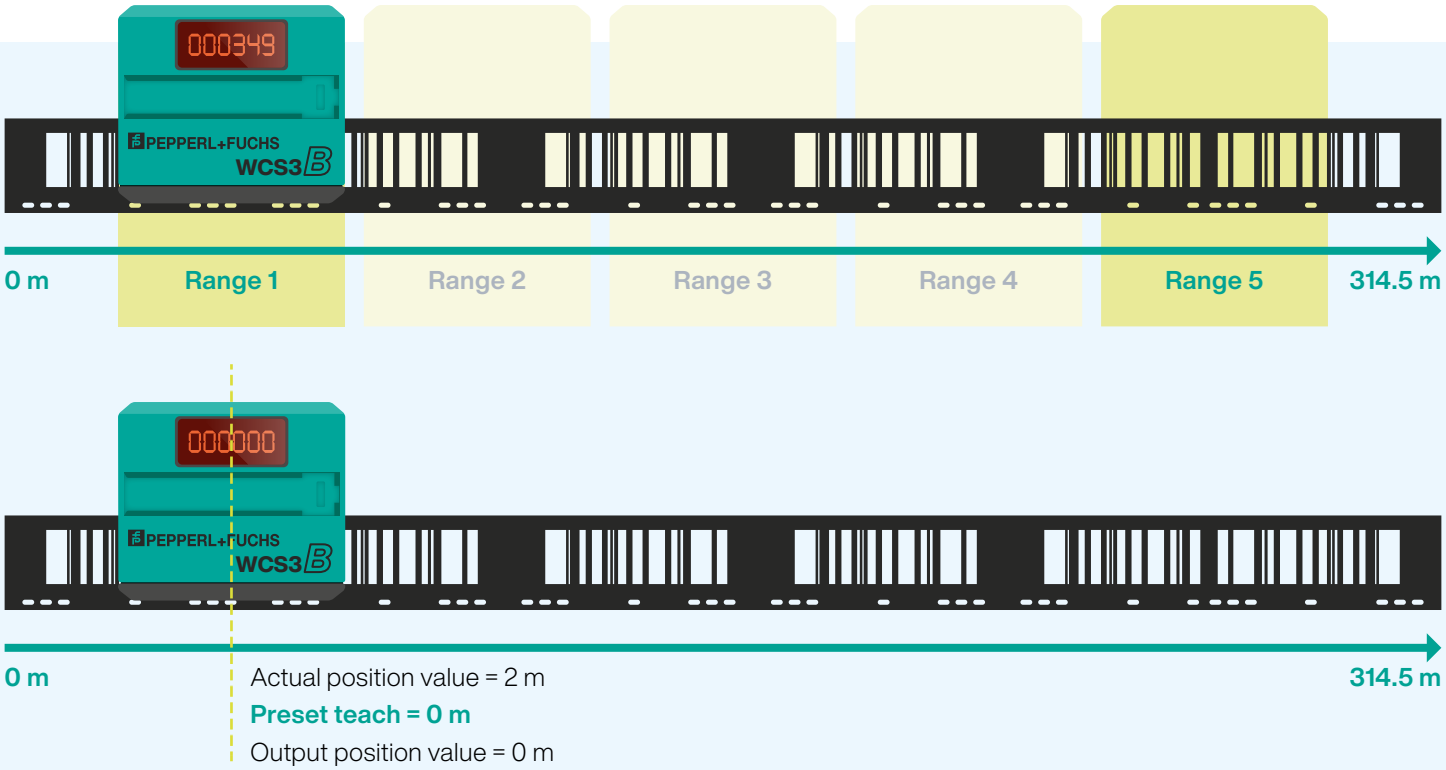


Maximum Accuracy and Reliability

An additional switching output can be configured for the read head to identify up to five individual position ranges, therefore replacing end position switches. With a dynamically adjustable preset value, the WCS with IO-Link outputs the absolute position relative to a default value instead of the actual value. The sensor can also be used to identify individual mobile components: Up to 1,260 code tape segments are reliably recognized as an ID number.

Highlights

- Millimeter-accurate absolute position detection over 314.5 m—including in harsh environments
- Economic solution: IO-Link for easy commissioning and seamless integration into IIoT applications
- Optimal plant availability: Integrated acceleration and temperature sensors enable predictive maintenance
- Reliable processes through output of position ranges, heartbeat signal, and direction bit
- High flexibility: automatic display rotation, preset function, and muting control for optimal adaptation to the application



Flexible Mounting for Complex Situations

The WCS code rail is available in metal or plastic. Both variants are designed to be incredibly rugged and optimized for use in the most difficult of conditions. The rails can be laid on straight sections as well as on curved paths, ascents, and descents.

Well-Designed System for Easy Installation

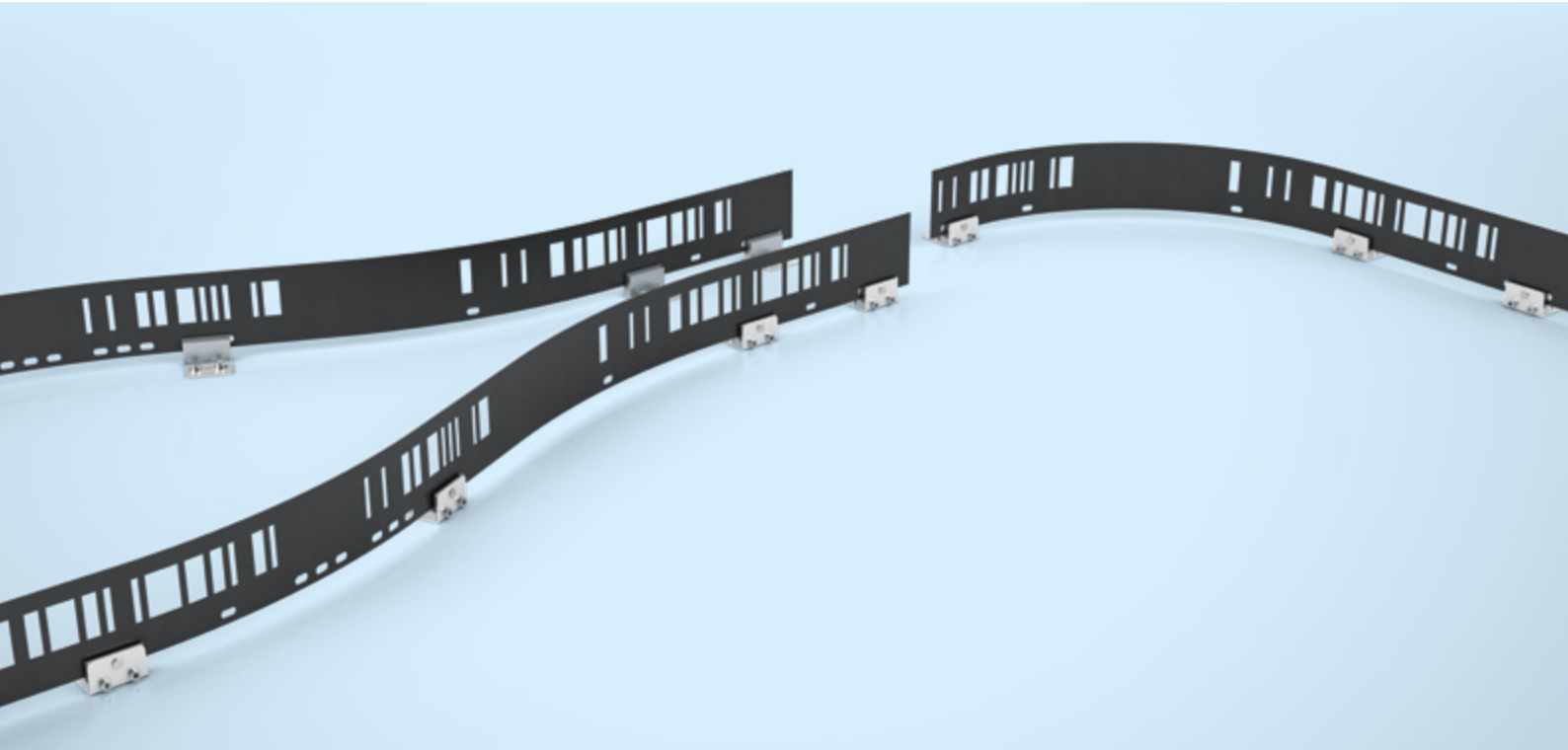
A modular mounting system simplifies mounting, even on curved paths, ascents and descents, interruptions, and lane changes. Reference points are not required. The tear-resistant and chemically resistant plastic rail is unaffected by oils, fats, and solvents.

The stainless steel rail is corrosion-resistant and suitable for use in temperatures ranging from –40 °C to +80 °C. It can withstand flying sparks from welding work and very high levels of contamination.

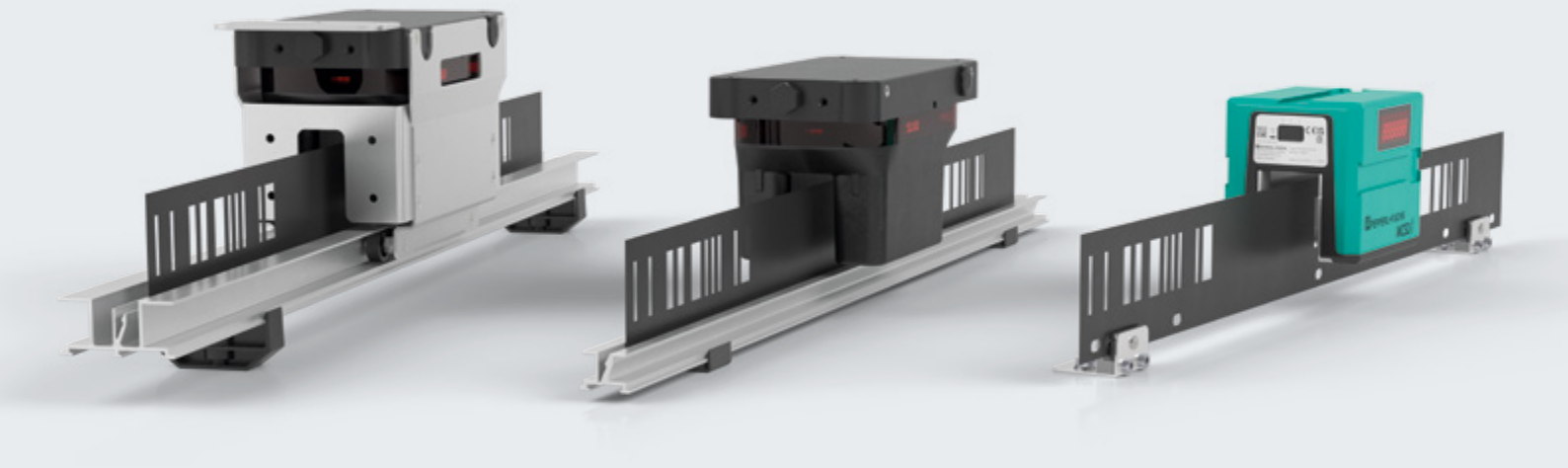
An ID pad is used to identify moving carriages: this short code rail segment is fastened to the mobile unit and detected by a statically mounted read head when it passes. This arrangement is also used for fine positioning.

Highlights

- Extended application length of up to 629 m
- Plastic rail—unaffected by oils, fats, and solvents, resistant to acids, alkalis, and aggressive gases
- Stainless steel rail—corrosion-resistant, suitable for use over a wide range of temperatures, withstands flying sparks and extreme contamination
- ID pads on the moving carriage for identification and fine positioning



WCS code rail for curved paths, lane changes, interruptions, and slopes



Aluminum profile with guide trolley (1), aluminum profile (2), code rail bracket (3)

Guide Trolley for Reliable Tolerance Compensation (1)

Pepperl+Fuchs offers a special solution for situations where the movement of the chassis causes major position fluctuations: A guide trolley decouples the read head from the vibrations of the vehicle and compensates for running tolerances between the vehicle and the WCS. The guide trolley is supported by the aluminum profile and the code rail, so that the read head is guaranteed to be in the optimal position at every point, even in the most challenging of conditions.

Aluminum Profile for Maximum Stability (2)

The aluminum profile serves as a fixture and guide for the code rail. It fixes and stabilizes the entire length of the code rail. For this reason, the aluminum profile is especially suitable for long, straight sections and for overhang installation.

Code Rail Bracket for All Configurations and Short Distances (3)

The code rail brackets are used for easy routing of the flexible rail around horizontal and vertical curves. They can also be used for straight sections. Mounting brackets and stabilizing profiles allow easy adaptation to different tracks. They are especially suitable for short sections.

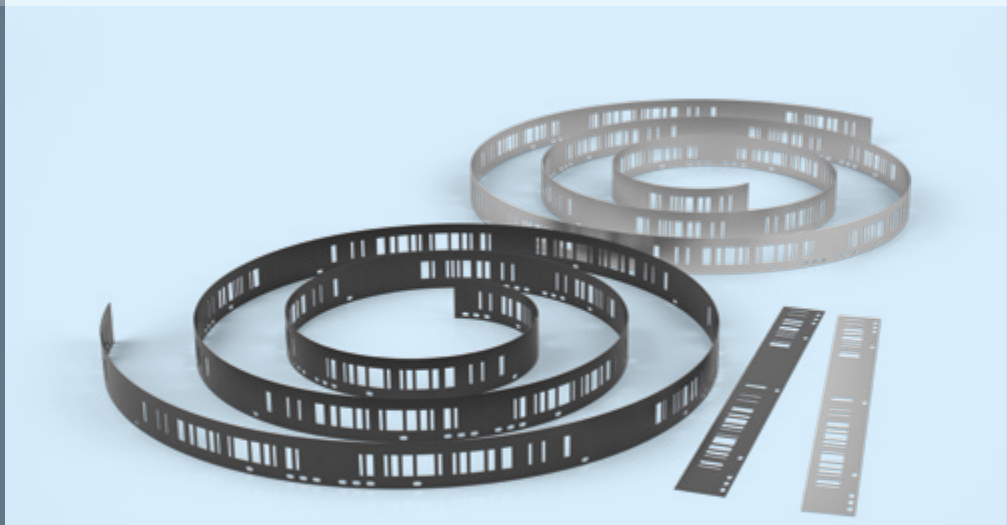
Modular System for Optimal Application Solutions

Read Head

Integrated Interfaces

- RS485
- SSI
- PROFINET
- EtherNet/IP
- EtherCAT
- CANopen
- IO-Link

Code Rail



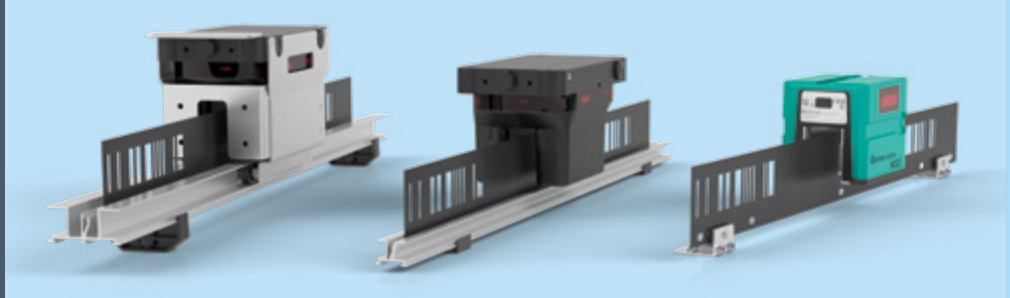
Materials

PL

Polyester Laminate

- Tear-resistant
- Unaffected by oils, fats, and solvents
- Chemically resistant to acids, alkalis, and aggressive gases

Mounting System



Mounting Syst

Aluminum Profile with Guide Trolley

- Decouples the read head from vehicle vibrations
- Compensates for running tolerances
- Optimal location guaranteed at any point

Interface Module

- PROFINET
- EtherNet/IP
- EtherCAT
- DeviceNet
- CANopen
- PROFIBUS DP

- Wide range of interface modules available
- Accommodates up to four RS-485 read heads
- Simplifies plant expansion

Options

Outdoor
- Protective housing with protection classes up to IP69
- Resistant to dust, moisture, and aggressive substances
- High impact resistance; tolerates high-pressure cleaning

Extended
- Track length up to 629 m
- No need to use multiple systems
- No additional programming effort

Display
- Position value display and diagnostic functions on the device
- Simplified commissioning, system setup, and fault repair
- Can be rotated by 180°

Integrated Heater
- For use at temperatures as low as –40 °C
- Quick commissioning, even in ice and snow
- Prevents condensation

IO-Link
- Integrated acceleration and temperature sensors
- Output of position ranges, heartbeat signal, and direction bit
- Preset function

Application

V2A

Stainless Steel

- Corrosion-resistant
- Temperature range from –40 °C to +80 °C
- Withstands flying sparks and very high levels of contamination

Positioning with Code Rail

- Using a polyester laminate or stainless steel code rail
- Absolute accuracy to 0.8 mm
- Easy system integration

Detection with ID Pad

- Attachment to the moving object
- Read head identifies chassis when passing
- Fine positioning
- Especially rugged for extreme environments

em

Aluminum Profile

- Fixture and guide for code rail
- Uniform fixing along the entire length
- Suitable for overhang installation

Code Rail Bracket

- Easy mounting on horizontal and vertical curves
- Easy to customize to different tracks
- Ideal for short sections

Connectivity

- Field-attachable connectors and prefabricated cables
- Standard cable suitable for drag chains

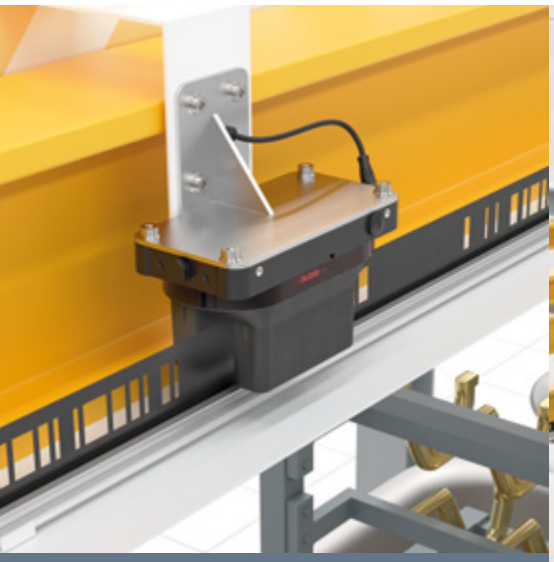
Precision for Demanding Applications

The special features of the WCS allow it to be used for a wide range of standard industrial applications, from elevator construction to special applications in extreme ambient conditions such as electroplating plants and port facilities.

Resistant to Acid and Alkalis

In electroplating plants, the parts are usually attached to metal frames (racks). Transportation units automatically move the rack and part to the immersion baths, where they are often immersed in extremely aggressive solutions. The temperatures in these baths can be high, and the ambient atmosphere is often saturated with vapors from the solutions.

The Outdoor variant of the WCS boasts features that make it appropriate for this application: The protective housing of the read head is specially designed for extreme environments and is resistant to aggressive substances. The same applies to the specially coated plastic code tape. Even the complex tracks in galvanizing plants—with their curved paths, ascents and descents, interruptions, and lane changes—are no problem for the WCS.



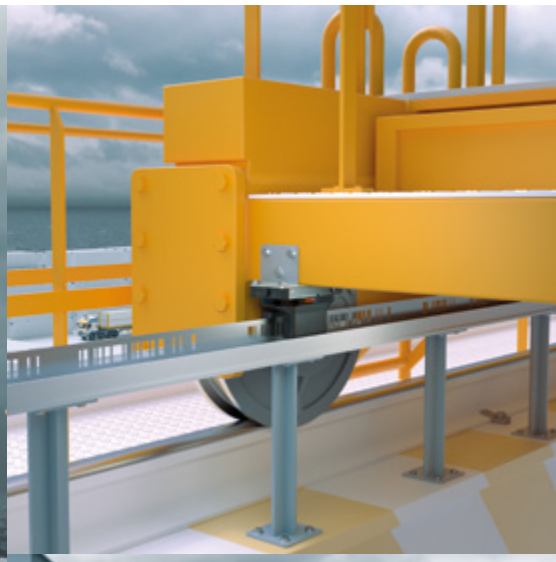
Safe Positioning in Any Condition

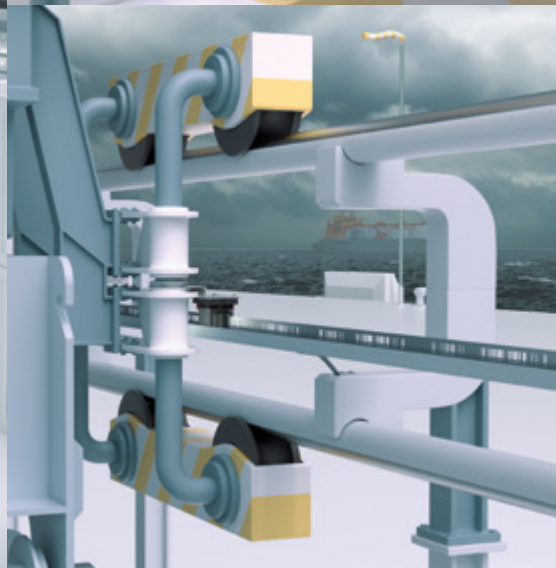
The protective housing of the WCS Outdoor is designed for extreme outdoor conditions. Not only is it resistant to salt water and salty air, but it is also highly impermeable to all types of moisture, with a protection class of up to IP69. Its high impact resistance means that the read head is not affected by hail and is protected against mechanical impacts.

Position detection is unaffected by fluctuations in temperature. The Outdoor and Extended variants can be combined for long distances, making WCS the ideal positioning sensor technology for modern port operations. Trolleys and rail-bound gantry cranes can be controlled with millimeter precision. Both are based on rugged stainless steel code rails using a WCS read head.

Typical Applications

- Gantry, automatic, and slewing cranes
- Automated storage and retrieval systems, moving carriages
- Monorail conveyors, rail-mounted intralogistics
- Elevators, lifting gear
- Galvanizing plants
- Carriage detection





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- Industrial Communication and Interfaces
- Enterprise Mobility
- Hazardous Area Products and Solutions

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