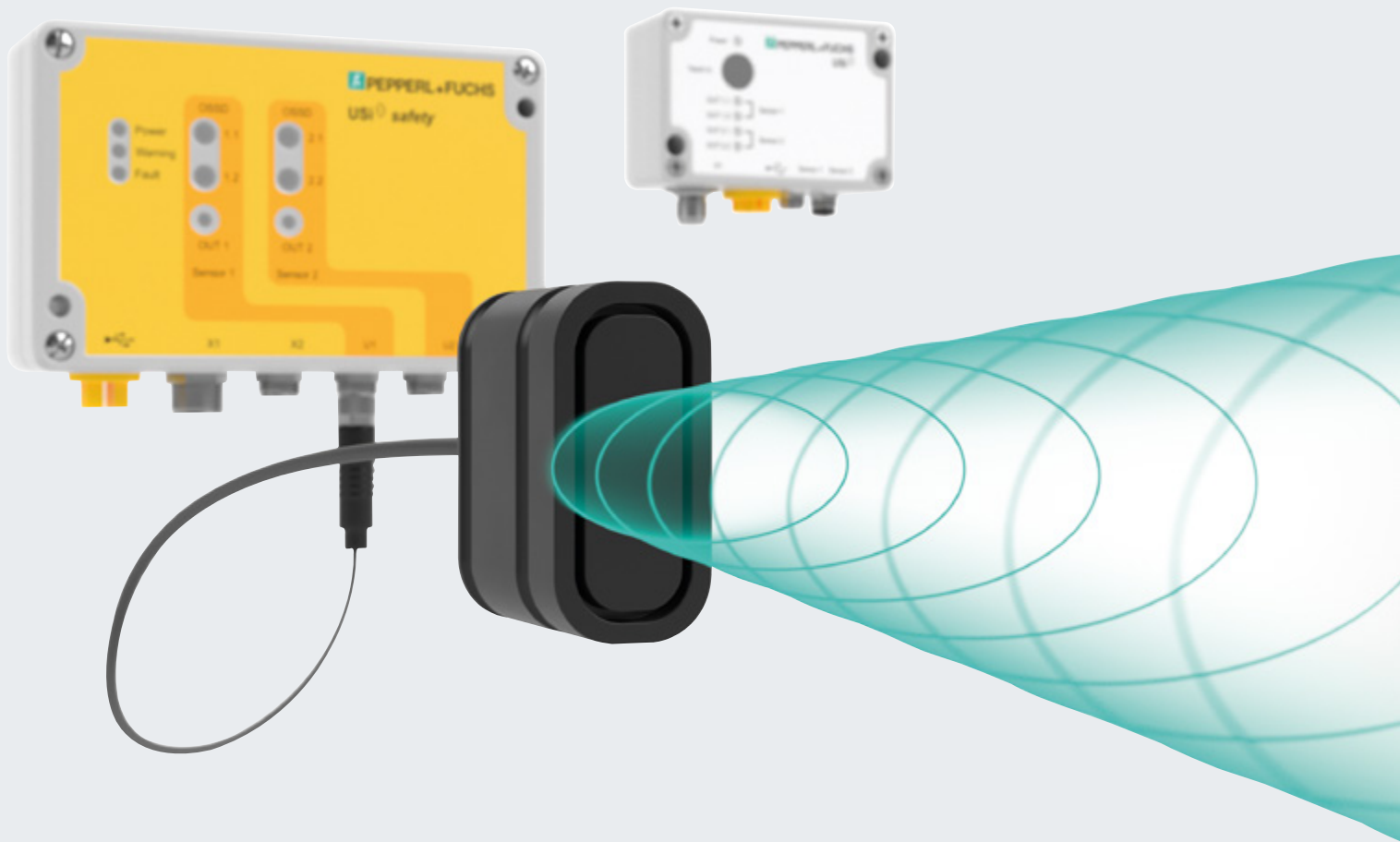


# Ultrasound— but Different.

Small, durable, versatile—the advantages of the unique sensor technology consistently improved.

Ultrasonic Sensor Systems  
USi<sup>®</sup>-industry and USi<sup>®</sup>-safety



Your automation, our passion.

 **PEPPERL+FUCHS**

# Multipurpose Sensor Family for Ultrasonic Detection in a Wide Range of Applications

State-of-the-art ultrasonic technology: the USi-industry and USi-safety reliably monitor or safeguard machines, vehicles, and access areas. The sensors are designed for demanding indoor and outdoor environments and for safety applications.



## Unrestricted Detection with Ultrasound

Sound waves are reliably reflected by people and objects. Contours, material, and optical properties have no effect on this behavior—nor do dust, dirt, vapors, or precipitation. This dependability makes noncontact ultrasonic detection highly robust; it forms the physical basis for reliable detection. The possible applications are virtually unlimited—in distance measurement and in environmental, access, and area monitoring.

## Rugged Ultrasonic Transducers in Miniature Housing Design

The ultrasonic transducers are decoupled from the evaluation unit. They can be up to 3 m in cable length apart and two transducers can be connected to one evaluation unit. Together with the miniaturized design, this concept offers great flexibility in placement, even under very restrictive conditions. The transducers have IP69 degree of protection, which means they are exceptionally resistant to dust and moisture. They can also function unhindered in areas exposed to the elements.

## Elliptical Sonic Lobe, Wide Sensing Range

Sound waves spread out from ultrasonic sensors in a cone shape. In the USi system, the shape of the sonic lobe has been optimized for typical applications: its cross-section is not round, but elliptical. The sonic lobe covers a larger area because of its wide transverse axis. This means that the system generates a large detection field and ensures reliable protection even just above the floor level or close to a wall.

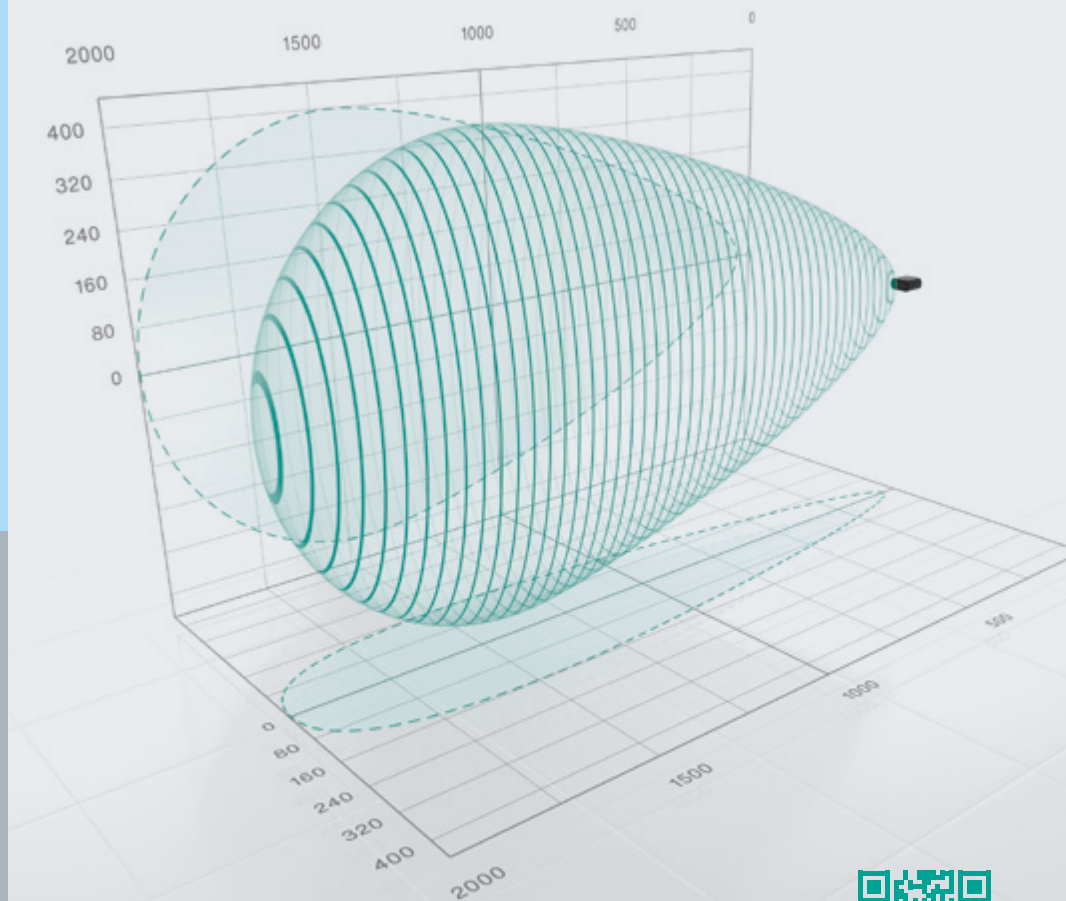
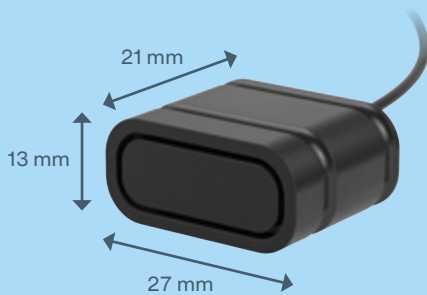
## Resistant to Tampering and Interference Echo

The teach-in mode allows the function of the USi systems to be adapted to the environment. Defined reference points, such as a fixed machine part in the sensing range, can be used to rule out tampering with the sensor systems.

When using multiple USi systems in parallel, unwanted mutual influences can occur due to interference echoes. These are reliably suppressed by an intelligent software algorithm. A physical connection between the sensor systems is not required for this purpose.

## Highlights

- Detached sensor system provides installation flexibility—the miniature ultrasonic transducers fit in tight spaces
- Optimal area monitoring through unique elliptical 3-D detection field
- Easy sensor integration and high tamper protection due to simple teach-in of the environment
- Maximum reliability: mutual interference echo suppression ensures smooth operation
- Detection regardless of target material, surface structure, and surface color



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

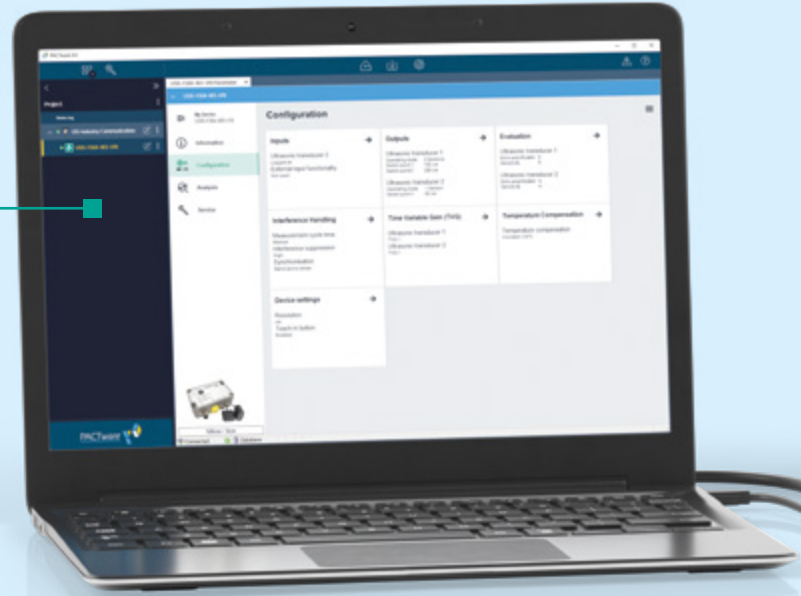


# Flexible Concept for Maximum Reliability

The USi system comprises two decoupled ultrasonic transducers, two intelligent evaluation units for selection, an optional temperature sensor, and intuitive parameterization software in two versions.

## Intuitive Parameterization Software

- Simple parameter adjustment
- Real-time display of echo signals (for diagnosis and visualization)
- Environment can be learned through external teach-in
- USi-industry: two switchable parameter sets per ultrasonic transducer
- USi-safety: simple initialization of periodic tests, automatically generated safety protocols






The image shows a white rectangular control unit with a front panel. The panel has a 'Power' button, a 'Switch' knob, and two sensor channels labeled 'Sensor 1' and 'Sensor 2'. Each channel has an 'INPUT' and an 'OUTPUT' terminal. Two black cables are plugged into the input terminals. The unit is connected to a white base with two black ultrasonic transducers mounted on top.

### USI\*-F264\* Evaluation Unit for Standard Applications

- Control unit for connection of one or two ultrasonic transducers
- Various operating modes
- Inputs and outputs for a variety of applications
- Built-in temperature sensor for automatic temperature compensation



The image shows a white rectangular control unit with a front panel. The panel has a 'Power' button, a 'Switch' knob, and two sensor channels labeled 'Sensor 1' and 'Sensor 2'. Each channel has an 'INPUT' and an 'OUTPUT' terminal. Two black cables are plugged into the input terminals. The unit is connected to a white base with two black ultrasonic transducers mounted on top.

### USI-F262\* Evaluation Unit for Safety Applications

- Control unit for connection of one or two ultrasonic transducers
- Two integrated microcontrollers for redundant function monitoring
- System single-fault tolerance in accordance with EN ISO 13849-1
- Two safe, short-circuit, and crossed-circuit-monitored OSSD outputs
- Additional message output per sensor channel



The image shows a white rectangular base with two black ultrasonic transducers mounted on top. The transducers are cylindrical with a flat top surface. They are connected to a control unit via black cables.

### USI2500-27X13E\* Ultrasonic Transducer

- Miniaturized design, IP69 degree of protection
- Decoupled unit, up to 3 m cable length for flexible positioning
- Up to two independent ultrasonic transducers per evaluation unit
- Optional: mounting kits for various installation situations

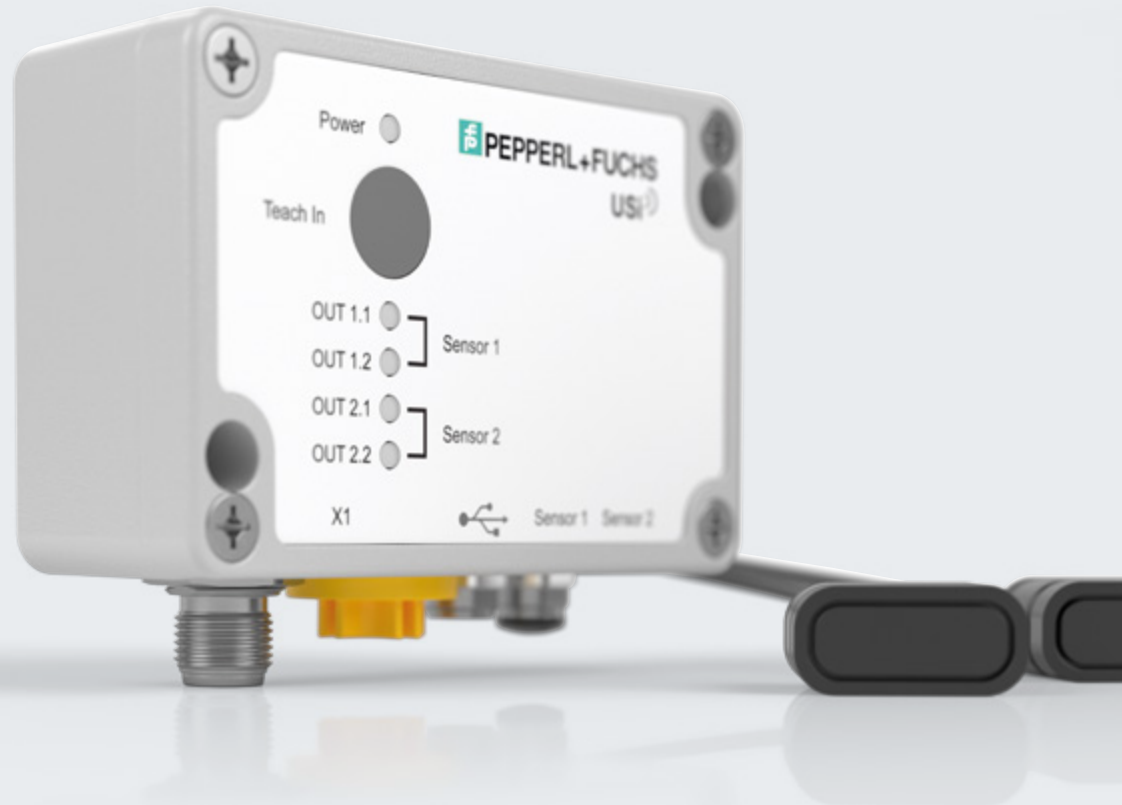


The image shows a white rectangular base with two black ultrasonic transducers mounted on top. A small black temperature sensor is mounted on the base in front of the transducers. The sensor is connected to a control unit via a black cable.

### USI-TEMP\* Temperature Sensor (Optional)

- Flexible positioning
- Automatic temperature compensation of the ultrasonic measurement in the event of large temperature fluctuations

# Adaptable to Any Situation



**The USi-industry ultrasonic sensor system is characterized by its especially high flexibility in use. Independent sensor channels, switchable parameter sets, and different operating modes allow adaptation to a wide variety of applications.**

## **Independent Sensor Channels with Switchable Parameter Sets**

Up to two ultrasonic transducers with their own channels can be connected to the USi-industry evaluation unit. The two sensor units can be programmed differently; for each, two switchable parameter sets (e. g., for distance, evaluation, outputs) can be selected and configured with PACTware. Since only one evaluation unit is required for two ultrasonic transducers, the investment costs remain low.

## **Selective Evaluation in Three Operating Modes**

There are three modes of operation available: the sensor can respond to the presence or absence of objects, or report both types of object change. The selective evaluation is set after the environment has been taught in. The sensor cycle time can be specified in a range between 10 and 200 ms, depending on the application. A short sensor cycle time is required to detect objects in quick motion. A higher value stabilizes the measurement in sonically noisy environments.

## Highlights

- Maximum flexibility due to independent channels, each with two switchable parameter sets
- Three selectable operating modes and adjustable sensor cycle time for optimum adaptation to the application

Extract from technical data	USI*-F264* evaluation unit	USI2500* ultrasonic transducer
<b>Sensing principle</b>	Ultrasonic diffuse mode sensor	
<b>Sensing range</b>	2,500 mm	
<b>Operating voltage</b>	9 V DC ... 30 V DC	
<b>Output type</b>	4 switching outputs (PNP)/ 1 analog output (current), 3 switching outputs (PNP)/ 1 analog output (voltage), 3 switching outputs (PNP)	
<b>Degree of protection</b>	IP65	IP69
<b>Dimensions</b>	98 × 77 × 35 mm	27 × 13 × 21 mm



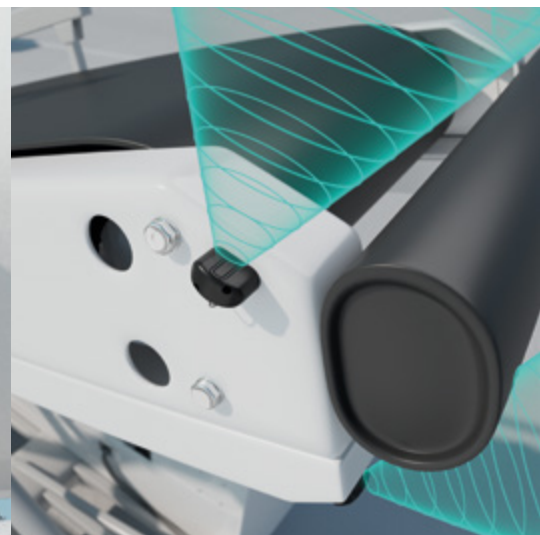
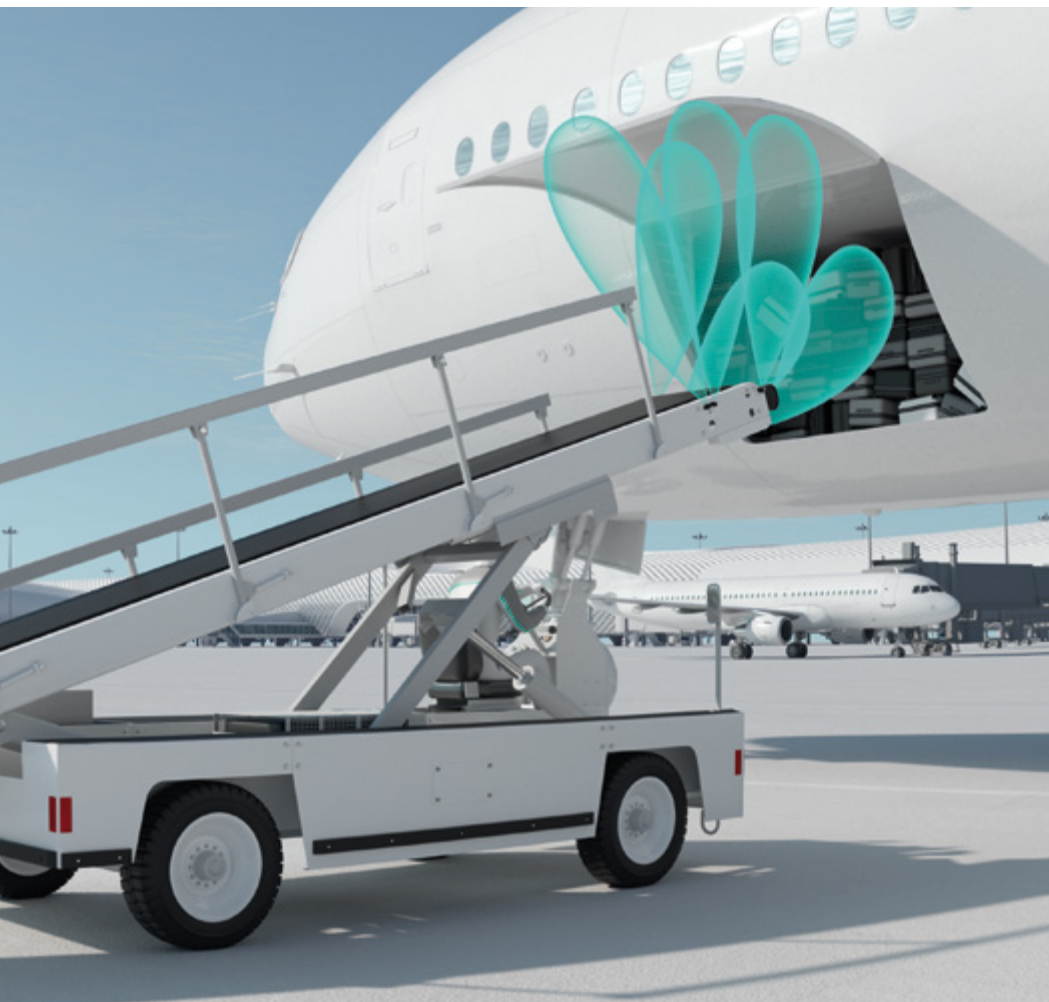
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# One Sensor, Many Options

From warehouse technology to aviation: the USi-industry ultrasonic sensor system offers optimal solutions for three-dimensional area monitoring in many different applications.

## Obstacle Detection on the Conveyor Belt Vehicle

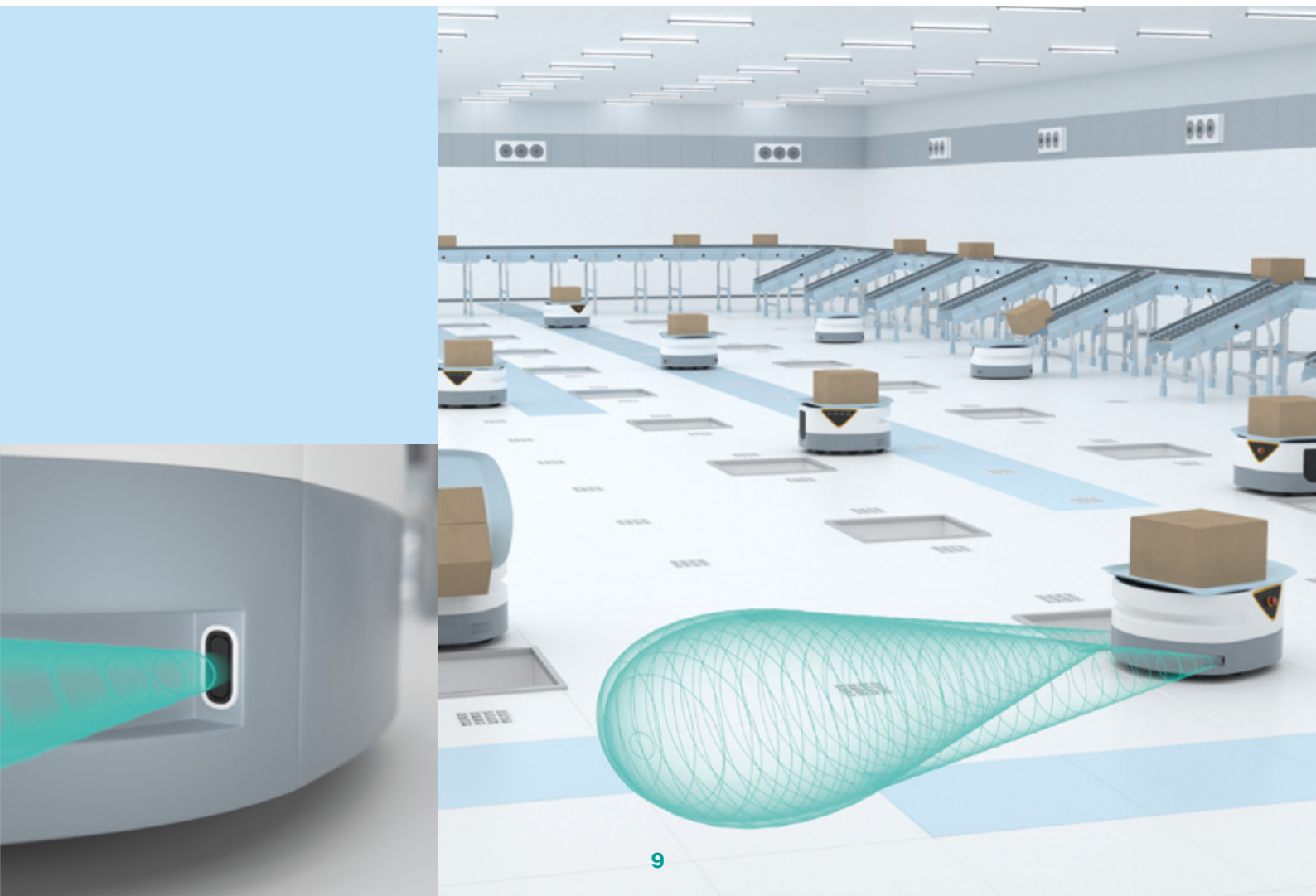
Baggage conveyor vehicles need to maneuver right up to the aircraft but must not collide with it—even the slightest damage could cause high consequential costs. The USi-industry ultrasonic sensor system monitors the movements of the vehicle and the boom in three dimensions. The miniaturized ultrasonic transducers fit into the smallest installation space; the system is resistant to weather influences, contamination, and optical interference. The wide contact area of the sonic lobe reliably detects every obstacle.





## Collision Protection for Fast AMR Traffic

In large warehouses and distribution centers, hundreds of autonomous mobile robots (AMRs) can be on the move at the same time. The USi-industry ultrasonic sensor system enables quick, smooth processes through the use of reliable collision protection. The compact ultrasonic transducers can also be accommodated in small bots. The elliptical sonic lobe enables noncontact monitoring of the movement area while in motion and reports any obstacles. The integrated interference suppression allows the simultaneous use of any number of USi systems.



# Safety without Limitations



**Dust and dirt, wind and rain, extremely confined spaces—until now, it has not been technically possible to create a safe solution for every environment. The USi-safety ultrasonic sensor system opens up completely new possibilities.**

## **Two Safe Sensors, One Safe Evaluation Unit**

Up to two ultrasonic transducers can be connected to the evaluation unit and each form a sensor unit. The evaluation unit has two channels and assigns two fail-safe outputs to each of the two ultrasonic transducers. For the signal output to a safety controller, each sensor unit has a signal output for the warning area and category 3 PL d safe OSSD outputs for the safety area. Each sensor channel provides reliable protection; one ultrasonic transducer is sufficient for a safe sensor system.

## **Your Choice of Safe Areas**

Two decoupled ultrasonic transducers can be installed independently of each other, with a cable length of up to 3 m away from the evaluation unit. A single USi-safety system can protect two sides or two movement directions of a vehicle. If the sonic lobes of both transducers point in the same direction, the sensing range is extended. A “sound curtain” of this type can be used to control access to security areas, for example.

## Highlights

- Unique ultrasonic technology meets safety standards up to category 3 PL d even in harsh environments
- Safe monitoring of up to two independent areas with just one USi-safety ultrasonic sensor system
- Comprehensive parameterization software automatically creates safety protocols and makes commissioning and documentation simpler

Extract from technical data	USI-F262* evaluation unit	USI2500* ultrasonic transducer
Sensing principle	Ultrasonic diffuse mode sensor	
Sensing range	2,500 mm	
Operating voltage	21 V DC ... 28 V DC	
Output type	2 OSSD outputs per channel 1 transistor output (PNP) per channel	
Degree of protection	IP65	IP69
Dimensions	125 × 91 × 41 mm	27 × 13 × 21 mm



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

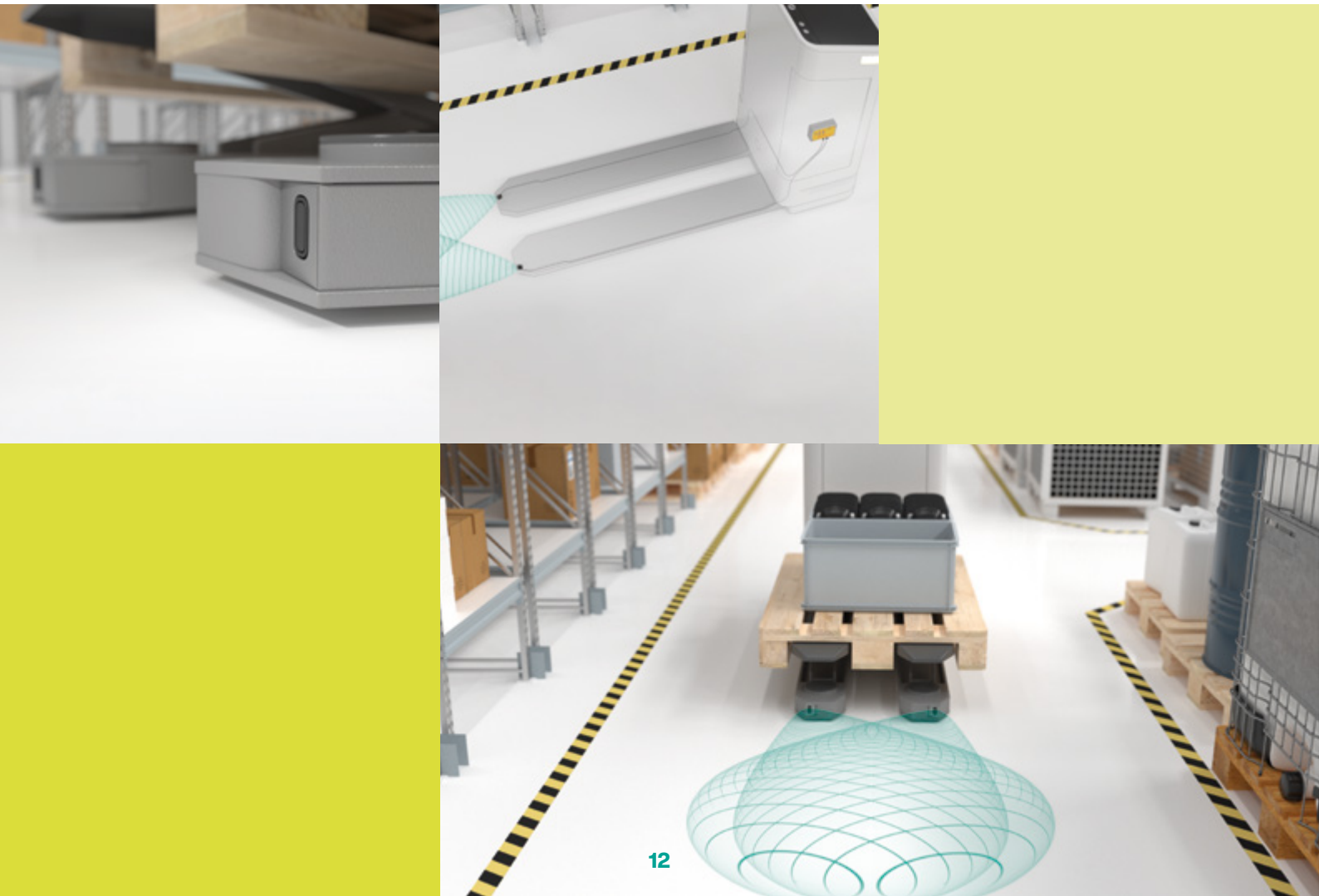
# Reliable Protection in Any Environment

Tight installation spaces, dusty environments—the unique ultrasonic technology guarantees maximum reliability in vehicle and machine protection. Whether for collision avoidance in the tips of forklifts or machine safeguarding in the timber industry, there are no limits to the USi-safety.

## Collision Avoidance in the Fork Tip

When safeguarding automated guided vehicles (AGVs), not only the main direction of travel but also the secondary direction as well as side protection are relevant. Due to structural characteristics, these are often very difficult or impossible to implement with conventional safety sensor technology. This is where the USi-safety sets new standards.

To protect the reverse travel of automated forklifts, the area in front of the fork is particularly critical. Due to their miniature housing, the ultrasonic transducers of the USi-safety can be integrated directly into the fork tips. With a cable length of up to 3 m, the detached evaluation unit finds its place in the chassis of the AGV.



## Robust Protection with Optimized Sound Beam

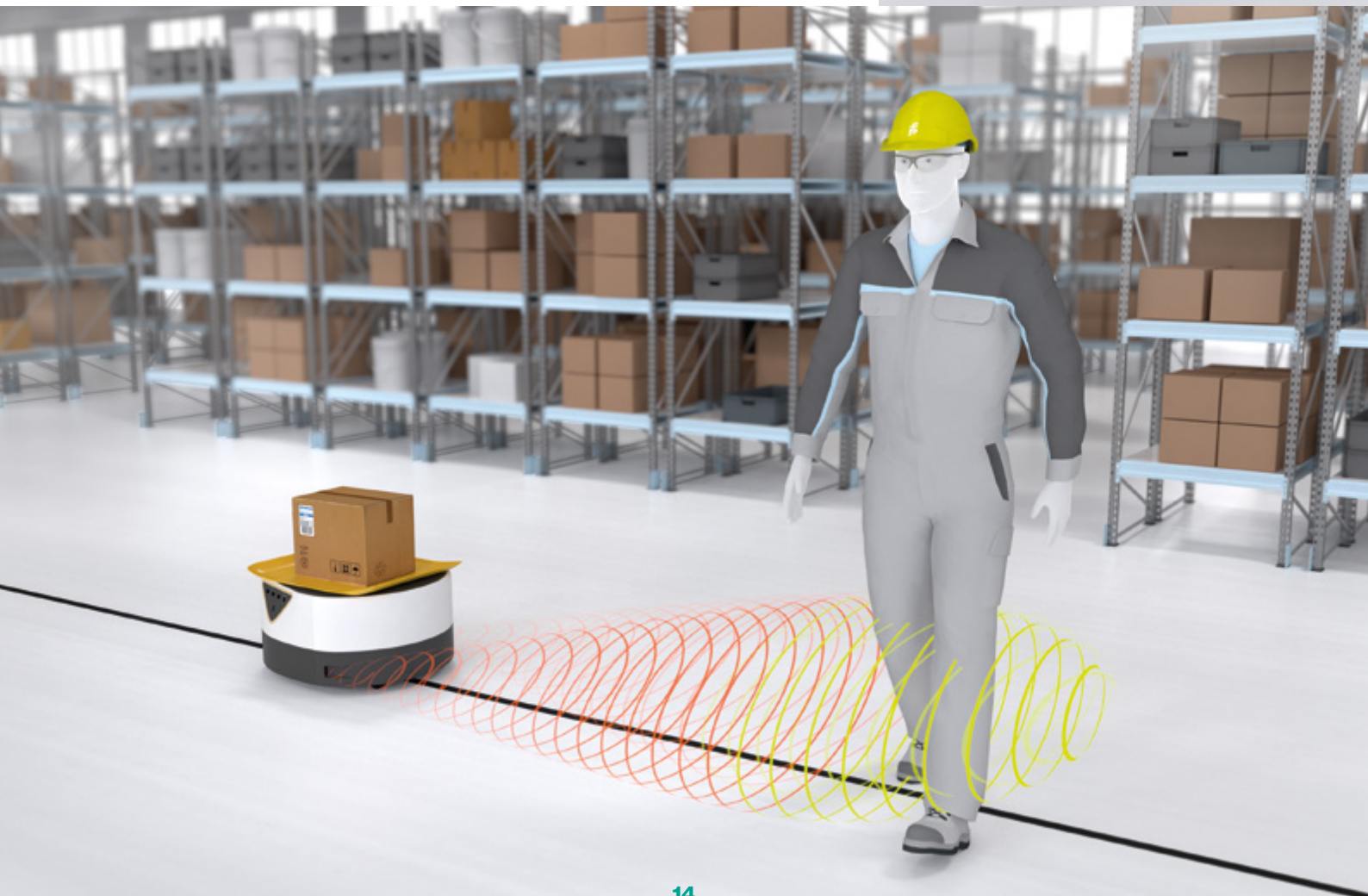
Mounted directly above the floor, the three-dimensional, elliptical “wide and shallow” sound beam optimally safeguards the blind zone between the AGV and the pallet up to PL d. Even whirled-up dust or other environmental influences do not affect the ultrasonic sensor system. With its unique features, the USi-safety is the perfect complement to conventional safety equipment in the AGV.



## Personal Safety in Lane-Guided AGVs

Lane-guided AGVs follow a lane applied to the ground and transport goods from one station to the next. If this is an area where people cross the specified paths of the vehicles, collisions must be reliably avoided to ensure personal safety. At the same time, the transport should not be interrupted unnecessarily.

The detection range of the ultrasonic transducers can be quickly and easily adapted to the conditions via the parameterization software. In addition to safe OSSD outputs for the safety field, each channel has a signal output that can be used to slow the AGV or issue a warning signal, for example.



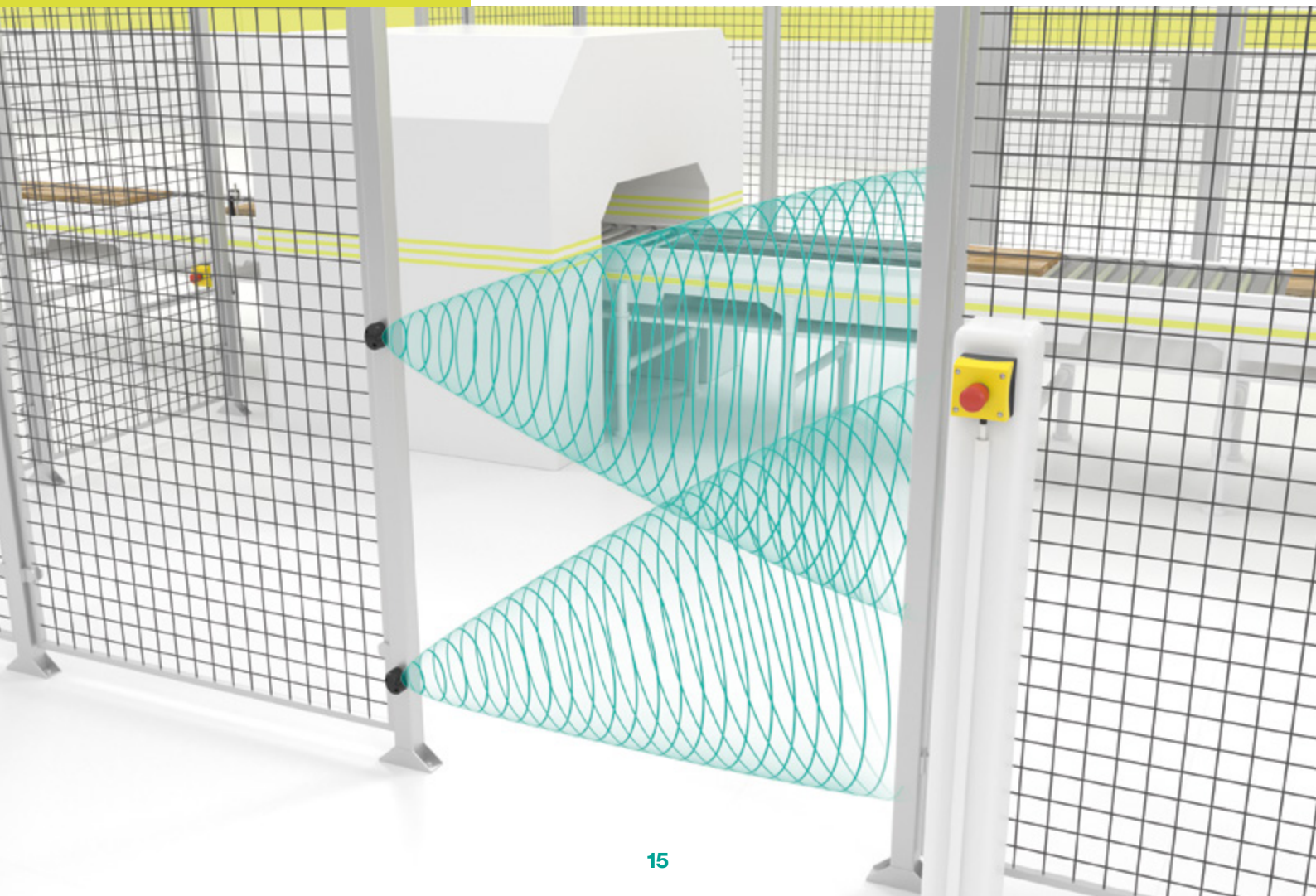


## Safe Access Control for Machines

Usually, machines are safeguarded by photoelectric light curtains. However, in demanding environments, such as in the timber industry, these have a major disadvantage: wood dust or other particles flying around can lead to false alarms and the machine switches into the safe state. The light grid must be cleaned and the machine restarted manually in order to continue with the process.

Used as a “sound curtain”, the USi-safety is insensitive to wood dust or other particles due to the ultrasonic technology. Unlike optical sensors, the USi-safety does not need to be kept clean, nor is the production process interrupted unnecessarily, and the machine is still reliably safeguarded.

In addition, the system offers a further advantage: fixed machine parts can be taught-in via the teach-in function and used for manipulation protection. If this reference target is no longer recognized due to manipulation, the system switches to the safe state.



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