

Reliable Collision Protection for Baggage Conveyor Vehicles

Rugged Detection with the Compact USi-industry Ultrasonic Sensor System

At a Glance

- Reliable detection of all objects and contours in the sensing range
- Surface properties and material of the objects have no influence on detection
- Insensitive to dirt and visual effects
- Rugged ultrasonic sensor system for outdoor use in all weather conditions
- Compact housing design enables flexible mounting

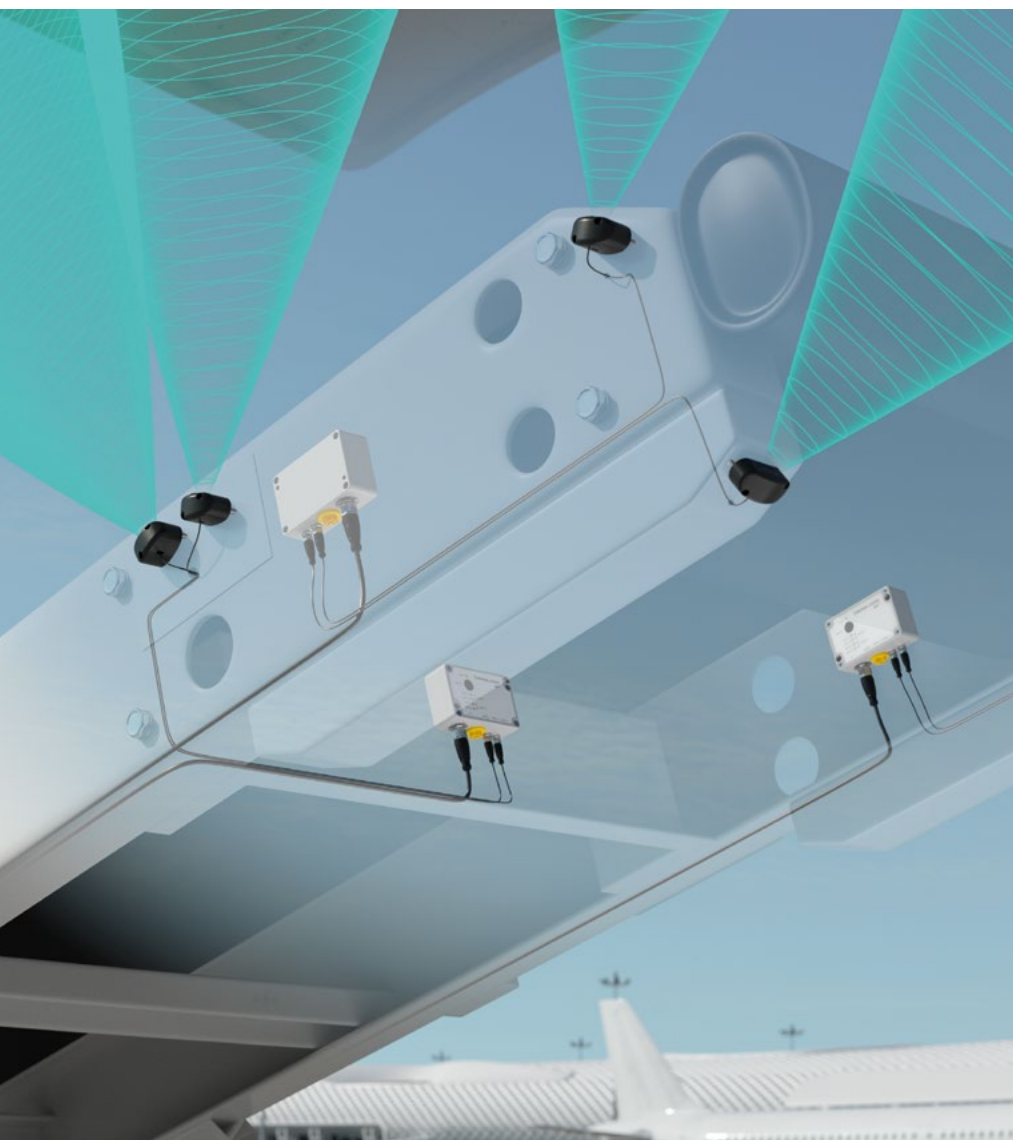


The Application

Airport ground equipment is used before and after each flight. Baggage handling, i.e., the loading and unloading of luggage and lightweight cargo, is carried out using baggage conveyor vehicles. Large conveyor vehicles have a driver's seat and are transported by ground staff in the area of the parked aircraft. The conveyor vehicles therefore maneuver directly up to the parked aircraft and move their conveyor body into and out of the cargo hold. A collision with the aircraft could cause considerable damage and flight delays, leading to expensive repairs and potentially high consequential costs due to flight cancellations and compensation.

The Goal

Any collision with the aircraft must be reliably avoided when maneuvering the conveyor vehicle. An intelligent driver assistance system is required to ensure smooth loading processes. Sensors mounted on the conveyor body measure the distance to the aircraft fuselage and, if necessary, trigger the vehicle to slow down or stop. Monitoring must be three-dimensional and unaffected by weather influences, optical interference, or contamination.



The Solution

The USi-industry ultrasonic sensor system monitors a three-dimensional sensing range. Noncontact ultrasonic detection detects all contours regardless of the material and optical properties of the object. Detection is not affected by dust, dirt, vapors, or precipitation. The ultrasonic transducers of the USi-industry system are extremely small and can be mounted very flexibly on the conveyor body, decoupled from the evaluation unit. Their elliptical sound field, with an opening angle of $\pm 17^\circ$ and $\pm 5^\circ$, functions as an acoustic sensor that detects all obstacles in the movement radius. Teach-in mode enables adaptation to a specific environment. With defined reference points, such as a fixed machine part in the sensing range, the system can be checked for functionality and tampering.

The Benefits

Several ultrasonic transducers are required to prevent collision between the conveyor vehicle and the aircraft. By connecting up to two sensors to one evaluation unit, investment costs are minimized. The ultrasonic transducers have their own channels and can be parameterized differently via PACTware—each with two switchable parameter sets (e.g., for distance, evaluation, outputs).

When multiple USi-industry systems are used in close proximity to each other interference echo suppression prevents signals from interfering with each other without any physical connection between the devices and prevents potential triggering due to multiple reflections. This allows multiple systems to be mounted on the same vehicle. Signaling remains unaffected even when in close proximity to systems on other vehicles.

Technical Features

- Sensing range: up to 2500 mm
- Degree of protection: ultrasonic transducer (IP69), evaluation unit (IP65)
- Operating temperature: -30°C ... $+70^\circ\text{C}$
- Operating voltage: 9 V DC ... 30 V DC
- Compact dimensions (ultrasonic transducer $27 \times 13 \times 21$ mm, evaluation unit $98 \times 77 \times 35$ mm)
- Elliptical sound field (opening angle of $\pm 17^\circ$ and $\pm 5^\circ$)

