



## MOBILE AUTOMATION

SENSOR SOLUTIONS FOR AGRICULTURAL AND FORESTRY MACHINES

**SICK**  
Sensor Intelligence.

# TASKS FOR AGRICULTURAL AND FORESTRY MACHINES

Providing innovative and intelligent sensor solutions, SICK has been shaping the logistics, factory and process automation sector as one of the leading global sensor manufacturers for decades.

With industry knowledge and a wide sensor-technology portfolio, SICK is the ideal partner for providing sensor solutions for mobile automation. Integrating sensors and sensor systems in agricultural and forestry machines create intelligent solutions suited for daily use that meet customer expectations both in terms of an increased yield and lower process costs.



More information about SICK sensor-technology portfolio  
→ [www.sick.com/mobile\\_automation](http://www.sick.com/mobile_automation)



## Solutions – designed for machine manufacturers

SICK has a comprehensive, innovative technology portfolio. Based on these technologies, SICK develops tailor-made sensor solutions for agricultural and forestry machinery manufacturers. The portfolio ranges from standard sensors and sensors with integrated application software through to complex sensor-system solutions. Please contact us. We would be happy to provide you with more information.



## Contour guidance

Driver assistance systems for contour guidance based on SICK laser scanners increase the efficiency of agricultural machines, while simultaneously relieving the strain on the operator. Thanks to intelligent sensors with integrated application software, the recorded raw data and the vehicle data are directly evaluated by the sensor. Application-relevant results are therefore available without resource-intensive processing in the driver assistance systems of the agricultural machinery manufacturer.



## Collision awareness

Driver assistance systems based on SICK laser scanners or 3D vision sensors reliably detect blind zones around mobile machines and warn the operator of potential sources of danger or accidents in good time. This means the driver is able to identify and prevent possible collisions early on. As a result, damage to the machine and the surrounding area is rare. The resulting reduced machine downtime is a significant benefit especially during the harvest season



## Positioning and detecting

Sensors such as encoders, inclination, proximity and ultrasonic sensors, as well as pressure and level sensors manufactured by SICK, are the basis of numerous positioning and detection tasks in the agriculture and forestry machines.



## WGS – DRIVER ASSISTANCE SYSTEM FOR DETECTING AND MEASURING A WINDROW

Integrating the WGS (Windrow Guidance System) – a TiM351 2D laser scanner with integrated application software – into a driver assistance system or vehicle automation system, allows the guidance of agricultural vehicles. The sensor system detects and measures the windrow. The TiM351 fitted to the vehicle profiles the ground in front of the vehicle transversely

to the direction of travel. Based on the ground profile, the system extracts the windrow profile, determines its position and calculates the cross-sectional area. The vehicle speed and the cross-sectional areas are combined to calculate and express the windrow volume. If the current wheel angle or yaw rate are available, the sensor calculates a vehicle model.

The exact windrow progression is determined using the vehicle's known proper motion. This allows for great precision when controlling the vehicle in a transverse direction and allows for optimal positioning in relation to the windrow.

→ [www.sick.com/WGS](http://www.sick.com/WGS)

### Features

- Determining windrow trajectory and absolute windrow position for automatic transverse control
- Determining the windrow volume for automatic speed control
- Integrated vehicle model for calculating the correct proper motion
- Integrated self-diagnostic function

### Benefits

- Save time and increase efficiency using automatic speed control to drive at the maximum working speed
- Effortless driving thanks to automatic steering and speed control, particularly in poor-visibility conditions or when driving at night
- Reduced machine downtime by avoiding material back-up
- Optimal filling and material distribution in the chamber
- Does not require a control unit thanks to an intelligent sensor with integrated application software
- The sensor specifies the windrow position and volume
- Simple integration in the vehicle due to standardized interface



### Fields of Application

- Forage harvesters, balers, tractors

## TIMBER HARVESTER



### Measuring tree trunks on the harvester

The rugged and highly compact AHS/AHM36 absolute encoders determine the gripper position to measure the tree-trunk diameter. A further encoder detects the feed rate, thereby measuring the length of the trunk.

- AHS/AHM36 CANopen absolute encoder



→ [www.sick.com/AHS\\_AHM36\\_CANopen](http://www.sick.com/AHS_AHM36_CANopen)



### Measuring the incline of the driver's cab and chassis

The TMS/TMM88 inclination sensor is used for reliable leveling of the driver's cab. Thanks to its efficient filter algorithms to suppress vibrations and its rugged design, it is particularly well suited for use in harsh ambient conditions. Its high accuracy over the entire measuring range and its outstanding temperature stability offer further advantages in such conditions.

- TMS/TMM88 inclination sensor



→ [www.sick.com/TMS\\_TMM88](http://www.sick.com/TMS_TMM88)



### Rear collision awareness

Whenever harvesters collide with objects in their surroundings, the results are almost always serious for the materials and people involved. The intelligent 3D assistance system with the Visionary-B 3D vision sensor improves collision awareness in harsh outdoor environments. It provides a real-time image with optical and acoustic warning signals. Even in bright sunlight or heavy rain, it helps the operator of the harvester to detect objects in blind zones around the vehicle. This means the operator can focus on his main task.

- Visionary-B 3D vision sensor



→ [www.sick.com/Visionary-B](http://www.sick.com/Visionary-B)



# BALER



## Determining the length of square bales

The compact AHS/AHM36 absolute encoder can determine bale length on square balers. By detecting the absolute position of the measuring wheel, the encoder determines the feed rate, and, thereby, the bale length. Thanks to its dust resistance and reliable, fully magnetic sensor, it is particularly well suited to this task.

- AHS/AHM36 CANopen absolute encoder



→ [www.sick.com/AHS\\_AHM36\\_CANopen](http://www.sick.com/AHS_AHM36_CANopen)



## Windrow guidance for balers

The WGS sensor system is based on the TiM 2D laser scanner and determines the position and height profile of the windrows. The system uses this information to calculate a target trajectory and makes it available on the CAN bus. Using this trajectory, the tractor-baler combination can be guided automatically. Furthermore, the WGS continuously determines the windrow volume and also sends this information to the CAN bus. This allows the speed to be controlled automatically, therefore providing the optimum volume flow so that the baler can work at its optimum performance.

- WGS driver assistance system



→ [www.sick.com/WGS](http://www.sick.com/WGS)



## Detection and positioning tasks in balers

The particularly rugged IMB inductive proximity sensors record axle speeds and take over positioning tasks in balers. Large, high-precision sensing ranges enable reliable process control when baling. Thanks to their stable and durable construction, the IMB help to reduce machine downtime during the time-critical harvest season. Even the installation – whether at the plant or on-site – is quick and easy thanks to visual adjustment indicators and self-locking nuts.

- IMB inductive proximity sensor



→ [www.sick.com/IMB](http://www.sick.com/IMB)



# CROP PROTECTION SPRAYER



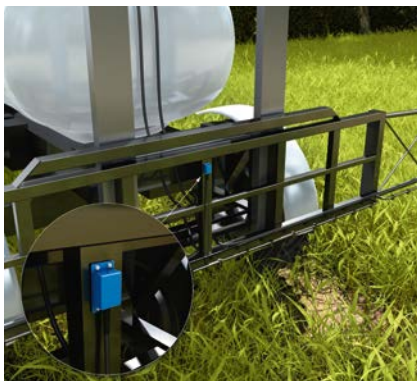
## Measuring the distance between the spray boom and crop

UM30 ultrasonic sensors are used to guide the spray booms on crop protection sprayers completely automatically. Depending on the spray boom construction, up to four sensors are required. The sensors are used to ensure the correct spraying distance, e.g., for crops that have grown very unevenly or for different terrains.

- UM30 ultrasonic sensor



→ [www.sick.com/UM30](http://www.sick.com/UM30)



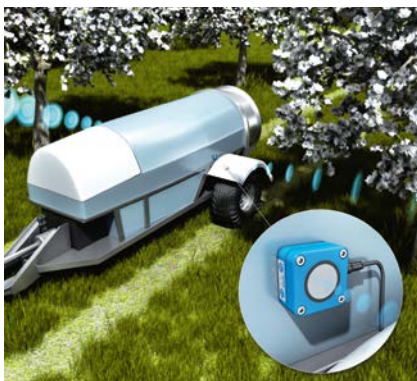
## Leveling the spray boom

The compact TMS/TMM61 inclination sensor is used to level the spray boom. Thanks to the sensor, the spray boom level can be adjusted for different terrains, for example. The TMS/TMM61 is suitable for this precise leveling task as it offers high accuracy across the entire measuring range, outstanding temperature stability and compensated cross sensitivity as well as configurable vibration suppression.

- TMS/TMM61 inclination sensor



→ [www.sick.com/TMS\\_TMM61](http://www.sick.com/TMS_TMM61)



## Crop detection on sprayer units for fruit-growing

Different tree distances, plant heights and gaps often reduce the efficiency of sprayer units in fruit-growing. To optimize the spray output, UC30 ultrasonic sensors are used to detect the crop. Thanks to its sensing range of up to 8 m and reliable detection capacity, the UC30 can control the spray-nozzle activation with extreme precision and reliability. The UC30 can also be used to activate/deactivate the application on head-land. As a result, the sensor ensures a more efficient spray output, while assisting the operator at the same time.

- UC30 ultrasonic sensor



→ [www.sick.com/UC30](http://www.sick.com/UC30)



## FORAGE HARVESTER



### Windrow guidance for forage harvester

The WGS sensor system, which is based on the TiM 2D laser scanner and mounted on the forage harvester's roof, determines the position and height profile of the windrows. The system uses this information to calculate a target trajectory and makes it available on the CAN bus. The forage harvester can be guided automatically along this path. Furthermore, the WGS Pro continuously determines the windrow volume and also sends this information to the CAN bus. This allows the speed to be controlled automatically so that the forage harvester can work at its optimum performance.



→ [www.sick.com/WGS](http://www.sick.com/WGS)

- WGS driver assistance system



### Collision awareness on the forage harvester

Particularly when maneuvering in blind spots or reversing, collisions with objects at the rear of the forage harvester are likely to occur. The intelligent 3D assistance system with the Visionary-B 3D vision sensor is used to assist the driver in these maneuvers and to prevent damage. It provides a real-time image with optical and acoustic warning signals. Even in bright sunlight or heavy rain, it helps the forage harvester operator to reliably detect objects in blind zones around the vehicle and warns the operator in critical driving situations.



→ [www.sick.com/Visionary-B](http://www.sick.com/Visionary-B)

- Visionary-B 3D vision sensor



### Measurement of hydraulic pressure

The PET pressure transmitter is designed as an OEM product for use in hydraulic applications, such as forage harvesters. The high-volume production provides an optimal cost-benefit ratio, even for tailor-made application-specific solutions. Thanks to its completely welded, hermetically sealed stainless-steel membrane, high overload resistance and pressure-spike control, the PET is suitable for applications in mobile machines.



→ [www.sick.com/PET](http://www.sick.com/PET)

- PET pressure transmitter

## SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With more than 7,400 employees and more than 50 subsidiaries and equity investments as well as numerous agencies worldwide, we are always close to our customers. A unique range of products and services creates the perfect basis for controlling processes securely and efficiently, protecting individuals from accidents and preventing damage to the environment.

We have extensive experience in various industries and understand their processes and requirements. With intelligent sensors, we can deliver exactly what our customers need. In application centers in Europe, Asia and North America, system solutions are tested and optimized in accordance with customer specifications. All this makes us a reliable supplier and development partner.

Comprehensive services round out our offering: SICK LifeTime Services provide support throughout the machine life cycle and ensure safety and productivity.

**For us, that is “Sensor Intelligence.”**

### Worldwide presence:

Australia, Austria, Belgium, Brazil, Canada, Chile, China, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Hungary, India, Israel, Italy, Japan, Malaysia, Mexico, Netherlands, New Zealand, Norway, Poland, Romania, Russia, Singapore, Slovakia, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, United Arab Emirates, USA, Vietnam.

Detailed addresses and additional representatives → [www.sick.com](http://www.sick.com)